Brandywine School District
Brandywine High School Renovations Phase 2
Theatrical Package
ABHA Project 1629

ADDENDUM NO. 1 ISSUED BY

ABHA Architects, Inc.
1621 N. Lincoln Street
Wilmington, Delaware 19806

NOTICE: Attach this Addendum to the Project Manual for this project. It modifies and becomes a part of the Contract documents. Work or materials not specifically mentioned herein are to be as described in the main body of the Specifications and as shown on the Dawings.

Acknowledge recipe of the Addendum in the spaced provided on the Bid Form. This Addendum is being transmitted to contractors who have received Contract Documents. If there are any problems with legibility or content, please contact ABHA Architects, Inc. (302) 658-6426.

ATTACHMENTS
Drawings: A-111.1, A-114.1, A-301, A-302, A-504

Specifications:
Section 11 6133 – STAGE RIGGING AND DRAPERIES
Section 11 6155 – STAGE LIGHTING SYSTEMS
Section 11 6156 – AUDITORIUM AUDIO AND VIDEO SYSTEMS

CHANGES TO PROJECT MANUAL:

Changes to the Advertisement for Bid:

The Mandatory Pre-bid shall be changed to:

A MANDATORY Pre-Bid Meeting will be held at **1:00 PM** on Monday, April 29, 2019, at the gymnasium lobby at Brandywine High School, 1400 Foulk Road, Wilmington, DE 19803 for the purpose of establishing the listing of subcontractors and to answer questions.

Add the following Sections to the Table of Contents:

DIVISION 11 – EQUIPMENT

11 6133	STAGE RIGGING AND DRAPERIES
11 6155	STAGE LIGHTING SYSTEMS
11 6156	AUDITORIUM AUDIO AND VIDEO SYSTEMS

Add the following drawings to the Table of Contents drawings list:
A-111.1 - NEW CONSTRUCTION FIRST FLOOR– AREA A
A-114.1 – NEW CONSTRUCTION SECOND FLOOR REFLECTED CEILING – AREA A
A-301 – BUILDING SECTIONS
A-302 – BUILDING SECTIONS
A-504 – AUDITORIUM CONTROL BOOTH

Add the following Sections to the project manual:
Section 11 6133 – STAGE RIGGING AND DRAPERIES
Section 11 6155 – STAGE LIGHTING SYSTEMS
Section 11 6156 – AUDITORIUM AUDIO AND VIDEO SYSTEMS

CHANGES TO DRAWINGS

G-001 – COVER SHEET: ADD THE FOLLOWING DRAWINGS TO THE DRAWINGS LIST:

A-111.1 - NEW CONSTRUCTION FIRST FLOOR– AREA A
A-114.1 – NEW CONSTRUCTION SECOND FLOOR REFLECTED CEILING – AREA A
A-301 – BUILDING SECTIONS
A-302 – BUILDING SECTIONS
A-504 – AUDITORIUM CONTROL BOOTH

Insert the following Architectural Drawings: (For Reference)

A-111.1 - NEW CONSTRUCTION FIRST FLOOR– AREA A
A-114.1 – NEW CONSTRUCTION SECOND FLOOR REFLECTED CEILING – AREA A
A-301 – BUILDING SECTIONS
A-302 – BUILDING SECTIONS
A-504 – AUDITORIUM CONTROL BOOTH

END OF ADDENDUM NO. 1

SECTION 11 6133

STAGE RIGGING AND DRAPERIES

1.00 GENERAL

1.01 SCOPE

A. Intent: This specification covers the fabrication, furnishing, delivery, provision, and installation of stage rigging systems, drapery track, stage draperies, and related equipment. The form of the contract, general conditions, and the project drawings are considered to be part of these specifications.

B. General: Provide all items and work necessary for complete, safe, fully functional systems as specified, including:

1. Tools, scaffolding, equipment, labor and supervision, even though they may not be specifically enumerated.
2. Verification of dimensions and conditions at the job site.
3. Coordination of the work of this section with structural steel, electrical systems, sprinkler systems, HVAC systems, roof drains, conduit, and other such systems whether under this contract or performed under a separate, prime contract.
4. Notification to the Architect/Engineer of any conditions, measurements, quantities, or other data, as required for proper execution, fit and completion of all work, and for safe and proper operating clearances.
5. Shipment of equipment to job site and the secured storage of all non-fixed equipment.
6. Installation and completion, in accordance with these specifications, related drawings, the equipment manufacturer's recommendations, established trade criteria, and all applicable code requirements.
7. Inspection, demonstration, and necessary adjustment of the completed installation by the Contractor's installation personnel.
8. Preparation and submission of complete record drawings and operational and maintenance data and certificates.
9. A one-year inspection by the Contractor.

C. Definitions: For this project, the following entities are referenced:

1. Brandywine School District, Wilmington, DE
2. Architect: ABHA Architects, Wilmington, DE
3. Theatre Consultant: Scheu Consulting Services, Inc., Fayetteville, NY

D. Errors and Omissions: Any errors, omissions, or ambiguities found in these documents do not relieve the Contractor of the responsibility of providing all items necessary for complete, safe, fully functional systems. Any errors, omissions, or ambiguities shall be brought to the attention of the Architect/Engineer of Record, Construction Manager, Owner, and/or Theater Consultant for clarification.

E. Work Included: The work of this section shall include, but not be limited to the following:

1. Provide one (1) 5 line 500 lb. live load capacity electrically operated, self-climbing, hoist rigging system for use with the Front of House stage lighting electric, complete with

distribution strip, distribution strip brackets, and stage lighting cable handling system. Coordinate all work with electrical contractor and stage lighting contractor.

2. Provide fifteen (15) each 8-line dead hung linesets for use with stage draperies, stage lighting electrics, and drapery tracks.
3. Provide a single channel hoist control station as specified herein, with keyed system on/off, 30'-0" control pendant, and emergency stop (E-stop). Coordinate with other theatrical equipment devices for lighting and AV located in the same area.
4. Provide new stage drapery tracks, as shown in the drawings and schedules.
5. Provide new stage draperies, as shown in the drawings and schedules.
6. Provide Owner training, manuals, and as-built drawings as described herein.

1.02 GENERAL REQUIREMENTS

A. Field Conditions: This project is the provision and installation of new stage rigging systems within a new venue. All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation or time extension will be given for conditions of which bidder could have been fully aware prior to bid.

B. Safety: The systems shall conform to all applicable code requirements and shall be provided and installed in conformance to industry standards of operation and practices. All materials, arrangements, and procedures shall comply with applicable code requirements, allowing the end user to arrange and operate a safe assembly and working environment for audience and user's personnel.

C. Insurance: In the absence of more stringent requirements, the Contractor shall maintain sufficient injury and property liability insurance coverage throughout the project's scheduled timetable, including workmen's compensation coverage for the Contractor's employees.

1.03 CONTRACTOR QUALIFICATIONS

A. All equipment and installation shall be the responsibility of a single contractor who shall own and operate a full-time, staffed shop for the fabrication and/or assembly of stage equipment. This Contractor shall assume complete responsibility for the design, fabrication, transportation, and installation of the work in this Section, and shall hold the Owner, Architect, Theater Consultant, and all their Employees and Consultants harmless for any costs for errors or omissions associated with the work of this Section and any action arising there from.

B. If the Contractor does not manufacture or fabricate the major components of the stage rigging systems themselves, then they shall be a manufacturer's authorized dealer and installer of that manufacturer's stage rigging equipment.

C. The Contractor shall have at least ten (10) years' experience in the installation of similar equipment and systems for professional and educational theaters. If requested, the Contractor shall submit a representative list of professional theater installations.

D. The Contractor shall be a member in good standing of the Entertainment Services and Technology Association (ESTA) and maintain qualifying membership for the duration of the project.

E. The Contractor's field supervisor shall be an ETCP Certified Theater Rigger in good standing for the duration of the project.

F. Contractors not having a qualified and experienced sewing room as an integral part of their operation shall employ the services of a qualified and experienced Sewing Sub-contractor for the fabrication of stage draperies. Sewing Sub-contractor shall have at least ten (10) years' experience in the fabrication of draperies for professional theaters. If requested, the Theatre Equipment Contractor shall submit a representative list of professional theater projects performed by the Sewing Sub-contractor during the above period.

1.04 SUBMISSIONS

A. Drawings:

1. Submit plans, elevations, sections, and equipment schedules to the Architect of all systems, components, installation methods, and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, load ratings, installation and use of system components in all phases of operation.
2. The drawings shall be no less detailed than those provided in the contract documents.
3. All drawing shall be reviewed and sealed by a State of New York Professional Engineer familiar with the manufacture and installation of stage rigging systems.
4. System plans, elevations, and sections shall be submitted on minimum D-size (24x36) sheets, and shall be drawn in no less than 1/4"=1'-0" scale.
5. Submit in a form (electronic or hard copy) and in quantities as required by the Architect,

B. Catalog Cuts: In lieu of detailed equipment drawings, the Contractor may submit catalog cuts for standard, unmodified equipment.

1. All catalog cuts shall contain full information on dimensions, construction, applications, load ratings, etc., to permit proper evaluation.
2. Catalog cuts shall be properly identified as to their intended use. Any options or variations shall be clearly noted.
3. Detailed drawings of any modified standard equipment shall be submitted for approval as described in Section 1.04.A.
4. Catalog cut sheets shall be prepared and bound in a professional manner, with each sheet properly indexed to a "Table of Contents". Loose or stapled sheet sets are not permitted.
5. All copies of catalog cut sheets must be clear and legible.
6. Submit in a form (electronic or hard copy) and in quantities as required by the Architect,

C. Samples: Provide samples of all fabrics and color choices for selection and approval. Hardware or component samples shall be provided upon written request. Submit in quantities as required by the Architect.

D. Approvals: All submissions must be approved per the requirements of the project's general conditions prior to the beginning any fabrication, installation, or erection. Such approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications or of providing fully operational and safe systems.

1.05 WARRANTY & INSPECTIONS

A. Warranty: The Contractor shall provide a one-year written guarantee against defects in materials and workmanship. Within this period, the Contractor shall provide any required maintenance or replacement within 30 days of written notification by the Owner, except for safety related items that shall be corrected within 48 hours of notification. Subsequent to the

expiration of the guarantee period, the Contractor agrees to furnish repair and maintenance service, at the Owner's expense, within 30 days of request for such service.

B. The warranty period shall being upon final written acceptance of the systems by the Owner.

C. One Year Inspection: At one year after the date of final acceptance, and as part of this contract, the Contractor shall provide a comprehensive inspection of all installed systems and components. Make all adjustments as may be required by normal wear and tear. This inspection shall be scheduled directly with the Owner and shall be done at the Owner's convenience.

D. Continuing Inspections: The Contractor shall offer the Owner estimated costs of a safety inspection and training program to be performed yearly. This program may include systems other than the stage rigging, such as production lighting and audio systems, as well as general backstage safety, at the discretion of the Owner and Contractor.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Quality Statement: While the equipment specifications contained herein may be based upon the standard equipment of one or more approved manufacturers, the individual component specifications are provided solely to set a minimum level of quality. Under no circumstances will equipment of lesser quality be accepted for this project.

B. Proprietary Equipment and Substitutions:

1. Whenever any product is specified by reference to the name, trade name, drawing, make or catalog number of any particular manufacturer or supplier, or by the very nature and/or detail of its specification is based on a proprietary product, the intent is not to limit competition, but to establish performance criteria and a standard of quality which has been determined as necessary for the Project.

2. A Contractor may, at its sole option, use standard products of pre-approved manufacturers, provided the equipment, systems, and installation is approved by the Architect, Consultant and the Owner, in accordance with the submittals approval procedures outlined in the project's General Conditions.

3. In all cases the Architect shall be the sole judge as to whether a proposed product is to be approved. The Contractor shall have the burden of proving, at its own cost and expense, to the satisfaction of the Architect, Consultant, and Owner, that the proposed product is similar and equal in performance and safety to the specified product. In making such determination, the Architect, Consultant and/or Owner may establish such objective and appearance criteria as they deem necessary that the proposed product must meet in order for it to be approved.

4. If the proposed product requires revisions or additions to any supporting building infrastructure (i.e. structural, electrical and/or mechanical), as detailed in the Project's complete contract documents at the time of bid, the Contractor assumes all responsibility for the coordination of the proposed product with the building infrastructure, the work of other trades, and any costs of additional infrastructure as may be required to provide the substitute product.

C. Approved Equipment Manufacturers: Due to the highly specialized nature of theatrical rigging and related equipment, and the safety requirements of the equipment, all fabricated theatrical

rigging equipment, drapery tracks, stage draperies, and other components shall be manufactured and supplied by one or more of the following approved manufacturers:

Stage Rigging Equipment:

Electronic Theatre Controls
3031 Pleasant View Rd
Middleton. WI 53562-0979
Tel: 800-688-4116
Fax: 608-836-1736

H & H Specialties, Inc.
PO Box 9327
South El Monte, CA 91733
Tel: 800-221-9995
Fax: 712-200-1936

iWeiss Theatrical Solutions
815 Fairview Ave, Unit #10
Fairview NJ 07022
Tel: 888-325-7192
Fax: 201-402-6530

JR Clancy, Inc.
7041 Interstate Island Road
Syracuse, NY 13209
Tel: 800-836-1885
Fax: 315-451-1766

Thern Stage Equipment
5712 Industrial Park Road
Winona, MN 55987
Tel: 800-553-2204
Fax: 507-454-5282

Stage Draperies:

iWeiss Theatrical Solutions
815 Fairview Ave, Unit #10
Fairview NJ 07022
Tel: 888-325-7192
Fax: 201-402-6530

Rose Brand
4 Emerson Lane
South El Monte, CA 91733
Tel: 800-223-1624
Fax: 201-809-1851

Stage Decoration & Supplies, Inc.
3519 Associate Drive
Greensboro, NC 27405
Tel: 888-220-3174
Fax: 336-621-5484

Syracuse Scenery & Stage Lighting
101 Monarch Drive
Liverpool, NY 13088
Tel: 800-453-7775
Fax: 315453-8096

Stage Drapery Tracks:

Automatic Devices Company
2121 South 12th
Allentown, PA 18103
Tel: 800-360-2321
Fax: 610-797-4088

H & H Specialties, Inc.
PO Box 9327
South El Monte, CA 91733

Tel: 800-221-9995
Fax: 712-200-1936

NO OTHER MANUFACTURERS SHALL BE CONSIDERED OR APPROVED FOR THE STAGE CURTAIN TRACKS ON THIS PROJECT.

A. Requirements for Approval: Other manufacturers seeking acceptance shall follow the procedures and requirements as outlined in the project's general conditions.

3.00 GENERAL MATERIAL REQUIREMENTS

3.01 STANDARDS

A. Materials shall conform to the following ASTM and ANSI standard specifications:

1.	A-36	Specification for structural steel
2.	A-47	Specification for malleable iron castings
3.	A-48	Specification for gray iron castings
4.	A-120	Specification for black and hot-dipped zinc-coated galvanized steel pipe for ordinary use
5.	B18.2.1&2	Specification for square and hex bolts and nuts

B. In order to establish minimum standards of safety, the following factors shall be used:

1.	Cables and Fittings	8:1 Safety factor
2.	Steel	1/5 of yield
3.	Bolts	SAE J429 Grd 5 (ISO R898 Class 8.8) Zinc plated
4.	Motors	1.0 Service Factor
5.	Gearboxes	1.0 Mechanical Strength Service Factor

C. Materials: All materials used in this project shall be new, unused, and of the latest design. Refurbished and obsolete materials are not permitted.

D. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause either a hazard or present any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be fabricated and installed to facilitate future maintenance and replacement.

E. Finishes:

1. Provide standard manufacturer's finishes except where noted.
2. Turnbuckles, clips, tracks, chains, and incidental hardware shall be plated or painted.

3.02 NEW STAGE RIGGING SYSTEM COMPONENTS

A. General: The following listing is provided as a general guide to the major components required for this project. It is not intended to be a complete listing of all equipment and components required to provide fully functional systems. Materials, fabrication, and installation shall be as shown in the drawings and as specified herein. The Contractor is solely responsible for providing all items necessary for complete, safe, fully functional systems that meet the intent of these specifications.

B. Bills of Materials

1. Provide one (1) each 5-line 500 lb. live load capacity electrically operated self-climbing hoist rigging lineset for use with the Front of House lighting electric, complete with stage lighting distribution strip, distribution strip brackets, and stage lighting cable handling system. Coordinate all work with electrical contractor and stage lighting contractor. This set shall be made up of (but not limited to) the following components:

1 ea	500 live load capacity electrically powered self-climbing hoist
5 ea	Beam attachment assemblies
5 ea	Dual 1/8" lift cables
5 ea	Lift line trim adjusters
1 ea	Batten with integral strut channel for attachment of stage lighting fixtures
1 ea	Multi-circuit stage lighting distribution raceway and brackets
1 ea	Lighting and hoist cable handling system as shown on the drawings, or per manufacturer's standard system (subject to approval)

2. One (1) channel hoist control as specified herein

3. Fifteen (15) each 8 line dead hung linesets for use with the stage electrics, Main Curtain, masking legs, masking borders, travelers, and cyclorama draperies. Each set shall be made up of (but not limited to) the following components:

8 ea	Min 300 lb RWL beam clamp (or other approved method)
8 ea	Hanging chain or wire rope assembly
8 ea	1/4" Trim chain assembly (if used with wire rope hanging assembly)
1 ea	1 ½" ID sched 40 pipe batten in lengths as shown on the drawings
1 lot	Drapery Tracks as specified herein and as shown in the drawings and schedules

4. One (1) lot stage draperies as specified herein and as shown in the drawings and schedules

3.03 RIGGING EQUIPMENT SPECIFICATIONS

A. Stage Rigging Hoist - General

1. Hoists shall be purpose-designed and fabricated for overhead lifting of theatre lights, equipment, curtains and scenic elements, whether used on stage, in the auditorium or other places of public assembly where people shall move beneath the suspended or moving load. The systems shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment; they shall provide an engineered, efficient device for overhead lifting. Each hoist shall be fully tested throughout its full travel distance with all its lift lines

terminated to the hoist before the hoist is shipped from the manufacturer. Testing shall include:

a. Hoist operation
b. Hoist/motor speed
c. Lift line terminations
d. Primary load arrest device function
e. Secondary load arrest device function
f. Overload function
g. Slack line detection
h. Position sensing & calibration
i. E-stop
j. Deadman
k. Mechanical limits (initial hard and overtravel)
l. Hoist noise

2. Only hoists that successfully pass pre-shipment testing shall be sent to any job site. A record of testing and its results shall be available for review at the manufacturer's facility for at least one year after testing.

3. Anodization as required under this section shall be the manufacturer's standard finish and color except as noted.

4. All equipment items shall be new and conform to applicable provisions of Underwriters' Laboratories (UL 1340), American National Standards Institute (ANSI E1.6-1:2018, and C63.4:2014), and the National Fire Protection Association (NFPA 70).

5. Where acceptable equipment items are specified by catalog number only, device shall meet all published manufacturer's specifications. Where quantities or sizes are not given, refer to drawings. Where two or more products are listed, contractor may use either, at his discretion. Equipment shall not be substituted without specific written approval by the Architect under the substitution paragraphs of these specifications.

6. All turnbuckles and clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted. Wire rope shall be galvanized.

7. All materials used in this project shall be new, unused and of the latest design. Refurbished materials are not permitted.

8. In order to establish minimum standards of safety, a minimum design factor of 10 shall be required for all equipment and hardware used on this project. In addition, the following factors shall be used:

a. Cables and fittings 10:1 Design Factor
b. Cable bending ratio 25 times diameter
c. Maximum fleet angle 0 degrees

B. HOISTS

1. Each dual 1/8" wire rope lift line sets shall adhere to a design factor of 10:1 with an ultimate combined strength of 4,200 pounds.

2. Configured hoists components shall be capable of supporting a total live load of 500 pounds suspended from the batten.

3. The self-climbing hoist shall consist of the following major components:
    a. Motor Section
    b. Span Sections (if required)
    c. End Section
    d. A set of dual 1/8” GAC lift lines per section
    e. One batten and beam clamp per set of lift lines
    f. Pipe batten

4. Integrated into the bottom of the batten will be an aluminum strut-compatible channel.

5. The hoist shall be manufactured from UL Listed components and shall be UL Listed and tested as a complete system (not just UL listed parts).

C. DRIVE SECTION

1. The Drive Section shall include a fully enclosed, powder coated sheet metal housing that shall prevent contact with moving and electrical parts and shall provide protection against dirt, dust and debris.

2. The Drive Section shall contain the following elements: the gear motor, motor brake, limit switches, remote operating electronics, slack line detector, position sensor, cable drum assembly, and wire rope.

3. The hoist shall incorporate a built-in slack line sensor.

4. The hoist shall include the emergency contactor built into the hoist.

5. The following functions shall be available: operating switches, address setting knobs, limit switch override buttons, indicators for power, status and communication. Each of these functions shall be clearly labeled.

D. GEARMOTOR AND MOTOR BRAKE

1. The gear motor and motor brake shall be an integral unit from a single manufacturer. It shall operate on 208 Volt or 480 Volt 60 Hz 3-phase power, or 400 Volt 50 Hz 3-phase power for fixed speed models.

2. The motor brake shall be integral to the gear motor and shall be capable of holding 125% of the motor full load torque.

3. The motor brake shall be electro-magnetically held open, and spring actuated to apply and hold braking force.

E. Over Speed Load Arrest Brake

1. The over speed mechanism shall detect a runaway condition and trigger a load arresting device to stop the load.

2. Noise from the over speed brake shall not be audible at any time in the operational cycle of the hoist.

3. Normal hoist operation shall not be limited by heat or noise caused by the load brake.

F. WIRE ROPE DRUM:

1. Each Drive, Span, and End Section shall contain one drum.
2. Each drum shall accommodate two, 1/8" diameter 7 x 19 galvanized aircraft (utility) wire rope lift lines up to 50' long in a compact manner on the cable drum. The drum design shall prevent wire rope from tangling or crossing over itself.

G. - A limit switch assembly shall be mounted within the Drive Section for hard "normal" and "ultimate" end of travel limits. Hard end of travel limits shall be set/adjusted at the time of installation aided by an indicator light visible on a panel of the Drive Section enclosure. Any system that indicates that the limit is set only by audible or tactile means only shall not be acceptable.

H. Position Sensor: A position sensing system shall be built into the Drive Section to provide accurate position information. The system shall consist of an encoder sensor that provides accurate position information for each batten at power-up of the system, and continually throughout its normal operation. Hoisting systems that require re-homing shall not be acceptable.

I. Slack Line Detector: The slack line detector shall be built into the Drive Section. When a slack line condition in excess of 24" develops in a lift line, the slack line detector shall remove power from the hoist. The hoist shall be allowed to move only in the upward direction to allow removal of the cause of the slack line fault.

J. Local User Interface

1. User interface located on the Drive Section shall include:
    a. Hoist Up/Down Control
    b. Limit Switch Override buttons (tool accessible)
    c. Address switches
    d. Status LED's

K. Information Storage Within Drive Section

1. Record of severe fault conditions with date and time stamp
2. Record of E-stops, overloads, moves and power cycles
3. Record of travel distance since installation/inspection

L. Helix Cable Management

1. The power and control, load circuits and data wiring shall be fed to the distribution trough by one or more UL Listed Helix cable management systems that are specifically designed to interface with traditional stage distribution raceways. The Helix device shall allow the feeder cable and data wiring for both motor and lighting distribution to coil and store along the top of the hoist.
2. All cable shall be UL Recognized.
3. It shall be possible to provide power for up to six 20 amp circuits plus ground and a Cat 5e data line via each Helix cable management system.
4. These cable management systems shall interface with the circuit distribution device with standard mechanical and electrical hardware purpose designed for this assembly.
5. Hoisting systems that do not fully integrate cable management in the hoisting system and controller shall not be acceptable for this installation.

M. POWER AND CONTROL DISTRIBUTION

1. Each Drive Section shall include a power cord and Cat 5e (or better) hard-wired to the hoist with bare ends for field termination. Inclusion of a 20 amp 3-phase breaker in the junction box is optional. If the power and control cables terminate in the same enclosure, the wiring and optional connectors shall be incorporate a barrier between high and low voltage components. Proper strain relief at the Drive Section shall be provided.
2. The power/distribution channel shall be UL LISTED for this application.

N. Control

1. The entire motor system shall be operated by a fixed speed controller. It shall be purpose-designed and fabricated to manage and operate motors specifically designed for overhead lifting. Each system shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment and shall provide an engineered, efficient device to control the equipment. The mechanical, electrical and safety features of this control system shall establish the standard of quality, performance and safety by which motoring systems of other manufacture shall be evaluated.
2. The Control System shall consist of a surface mounted primary control panel with locking cover.
3. The control system shall also include one remote control device with 30’ of flexible cable that may be attached to the system at the control panel.
4. The controller shall include the following features:
    a. Key operated power switch
    b. LCD display for feedback/operating information
    c. Key operated motor load profile training/enable switch
    d. Latching motor selection buttons with rear illuminated naming tabs
    e. Rear illuminated hold-to-operate (dead-man) up and down operation buttons
    f. Dedicated E-stop button
    g. Outlet for wired remote

O. Control Enclosure

1. The Control Enclosure shall be a surface mounted assembly to be installed stage right as shown on the drawings. Coordinate location with other devices being provided in that area by the stage lighting, AV, and electrical contractors.
2. The back box and face panel shall be fabricated from 16 ga powder coated sheet steel specially formed to provide support for installation as well as support for all components installed within the housing.
3. The face panel shall be printed with complete labeling information to identify the function of each of the buttons in the control station.
4. The face panel shall identify the system as a controller for stage rigging.
5. The ring surrounding the E-stop button shall be safety yellow and shall be rear illuminated

P. Control LCD Screen

1. The liquid crystal display shall be purpose designed to communicate all information in easily readable text.
2. The screen shall be rear illuminated.
3. During system start up the screen shall show the progress of the motors diagnostics self-tests. Upon completion of the startup sequence the screen shall indicate that the system is "OK" or shall provide specific information should a fault be detected. Fault conditions shall be reported in human readable text. Systems that report fault conditions in a series of blinking lights shall not be acceptable for this installation.
4. When a motor is selected the LCD screen shall readout the motor name or number, its current position above the floor, the amount of weight suspended from the batten, the preset position that is recorded, as well as a bar graph scale that shows the current position of the motor, top and bottom limits and the current weight suspended from the motor.

Q. Operation Buttons

1. There shall be rear illuminated motor selection buttons. Buttons shall remain illuminated until de-selected.
2. When the up or down button is pushed and held, the hoist shall move to its next stop location. If the stop location is the adjustable preset, the hoist can be made to continue to travel in the selected direction by releasing and re-pressing the up or down hold-to-operate button until the next stop for the hoist is reached.
3. As a backup, there shall be dedicated hardware to detect and disable the system when the user attempts to move more than the configured maximum quantity of motors.
4. All buttons shall fit neatly within each of the cover panel cutouts on the controller.

R. Key Switches

1. A key switch shall control power to the control system. The key must be in the lock and the key turned to the on position for the motoring system to operate.
2. A separate key is required to turn on the load profiling system. That key must be in the lock and turned to the "ON" position for load profiling to function.
3. When load profiling is turned on the motor shall know the amount of weight that is supposed to be supported by the batten at any location in the path of travel. Should the weight exceed or be reduced below the profiled weight by a preset value, the motor shall stop operation until the fault is cleared.

S. Slack Line Detector: The slack line detector is located in the hoist assembly. When a slack line condition occurs, it shall cease motor movement and result in a fault message on the LCD screen on the controller. Movement in the upward direction shall be possible to clear the fault.

T. E-Stop: The E-stop button on the controller shall be a mushroom button with a rear illuminated ring surrounding the button. During normal operation the E-stop button shall be in the out position. An E-stop can be activated via this button by firmly pressing the button in. The button shall latch and immediately cause a class zero stop of all motors in the system. The LCD screen shall report this as an E-stop fault. To continue system operation the E-stop button must be cleared by twisting the button to release the latch. Power to the control station must be cycled off/on to re-initiate the system. This action shall also initiate a self-test of the entire control system and contactors.

U. System Diagnostics

1. Upon energization, the control system shall perform an automatic series of diagnostic tests that assure that all system safety functions are working. Should an error in the safety functions be determined, the controller shall report back a fault condition in the LCD display window and shall identify the nature of the fault.
2. Monthly, the system automatically shall perform an additional series of diagnostic tests to determine if there are any problems with any portion of the motor control system safety features. In the event of a problem, the controller shall report back a fault condition in the LCD display window and shall identify the nature of the fault.
3. Eleven months after a system inspection has been performed, the system shall remind the user to schedule full system maintenance/inspection. The reminder shall remain in the system with a count-down calendar until it is turned off by the factory authorized and trained inspector.
4. The installing contractor shall be able to leave contact information within the system. This information shall be displayed at power up and in the event of severe fault conditions.

V. Remote Control Pendant

1. A remote-control pendant with 30’ long attached cable and plug shall be provided for the system. The remote control shall plug to the control panel. When the remote control is plugged in, the E-stop on the remote shall be active. Systems requiring “shunt plugs” to bypass an unplugged remote control connector shall not be acceptable.

W. Trim Chains and/or Dead Hang Chain and Cables:

1. Hanging chains (if used) shall be ¼” diameter minimum Grade 30 proof coil chain.
2. Wire rope may be utilized as a hanging media, provided the assembly terminates at the pipe batten with a trim chain assembly as specified in Item 5 below. All dead hung cables (if used) shall be 1/4” diameter, 7 x 19 construction, galvanized, small diameter utility cable, with a breaking strength of 7,000 lb.
3. Trim chains used with hanging cables shall be 36" long, ¼” diameter minimum Grade 30 proof coil chain.
4. Connection between the end link any wire rope cable shall be made with a thimble and copper oval compression (Nicopress) sleeve.
5. Chains shall be wrapped one and one half turns around the batten and attached back to the thimble at the end of the hanging media with a standard ¼" forged shackle. Adjustment is made by connecting the shackle into a link along the return side of the chain.

X. Hoist Lift Cables:

1. All hoist lift cables shall be 3/16” diameter, 7 x 19 construction, galvanized, small diameter utility cable, with a breaking strength of 4,200 lb.
2. All manual counterweight lift cables shall be 1/4” diameter, 7 x 19 construction, galvanized, small diameter utility cable, with a breaking strength of 7,000 lb.
3. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.

Y. Beam Clamps:

1. Beam clamps shall have two 7 gauge, painted steel plates punched to grasp a beam flange. Each plate shall have multiple holes to allow adjustment for a range of flange sizes.
2. Clamps shall be complete with two 3/8" x 1" hex bolts with lock nuts, and a 1/4" round pin anchor shackle.
3. Beam clamps shall have a recommended working load limit (WLL) of at least 300 lbs.

Z. Cable Fittings:

1. Swaged sleeve fittings shall be copper Nicopress™. Swaged fittings shall be installed per the fitting manufacturer's instructions, using the appropriate tools, and checked with the appropriate Nicopress™ "Go - No go" gauge. Clamp type "cable clips" shall not be permitted.
2. Eyes shall be formed over galvanized wire rope thimbles of correct size.
3. Exposed cable ends shall be wrapped in high quality, "self-fusing" black silicon tape.

AA. Turnbuckles: Turnbuckles shall be drop forged and galvanized, and conform to ASTM F-1145 Type 1, Grade 1. Turnbuckles shall be moused after adjustment to prevent loosening.

BB. Pipe Battens:

1. All dead hung pipe battens shall be 1-1/2" nominal inner diameter, Schedule 40 black iron pipe in lengths as shown on the drawings.
2. All joints shall be spliced with 18" long sleeves with 9" extending into each pipe and held by two 3/8" dia. x 2 1/4" long hex bolts and low profile jam lock nuts on each side of the joint. Welded connections are not permitted. Gaps between pipe sections shall not exceed 1/8".
3. Each end shall be covered with a bright yellow, closed end, soft vinyl safety cap at least 4 inches in length.
4. Pipe battens shall carry set numbers and centerline indicator marks as specified in Section 3.04.A

3.04 EQUIPMENT LABELS AND MARKINGS

A. Pipe Battens:

1. For the dead hung sets, provide minimum 1½" tall field applied reflective white set number labels at the underside of each pipe at each end, just onstage of the plastic end caps. Hand numbering is not permitted.
2. Provide a 1" wide yellow enamel paint stripe at the stage centerline.

3.05 STAGE DRAPERY TRACKS

A. Stage Draperies Box Tracks

1. ALL TRACK AND COMPONENTS SHALL BE PROVIDED WITH BLACK FINISH.
2. Drapery tracks shall be of 14 gauge black painted galvanized steel, entirely enclosed except for slot in bottom, each half to be in one continuous piece except where splicing clamps are required. Aluminum track is not acceptable for this project.

3. Each drapery carrier shall be spaced on 12" centers and shall be of steel construction with two nylon-tired ball-bearing wheels held to steel body by rustproof nickel-plated rivet, such wheels rolling on two separate parallel treads. Each drapery carrier shall consist of a free-moving plated swivel and sufficient trim chain to accommodate drapery snap hook.
4. Live-end pulley and Dead-end pulley blocks shall be adjustable and shall be equipped with minimum 5" diameter sleeve-bearing wheels adequately guarded.
5. A rubber bumper shall be attached to each drapery carrier to function as noise reducer.
6. The manufacturer shall furnish two end stops for placement at each track end and a minimum 5” diameter tension floor pulley for increasing cord tension.
7. Provide the floor pulley with a demountable floor plate. Install floor plate flush into the stage floor as required.
8. Stretch-resistant operating cord shall be black and have a synthetic or wire center and shall be minimum 1/2" diameter.
9. Provide “Back-pack” devices for all cord operated track assemblies.
10. Track shall be rigidly supported from full pipe clamps on five-foot maximum centers.

B. Pipe Batten Clamps

1. All drapery tracks shall be suspended below their respective pipe batten by rigid pipe clamps. Under no circumstances shall hanging chains or other methods be used.
2. Pipe clamp supports shall be installed at a maximum spacing of 7’-0” on center, or as required by the track manufacturer.
3. Pipe clamps shall be made of two strips of 12 Ga. by 2" hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.
4. There shall be a 3/8" x 1" hex bolt with lock nut above and below the batten. A 5/8" hole in the bottom of each clamp half shall allow for the attachment of the track hangers.

3.06 STAGE DRAPERIES

A. Description and Sizes: New draperies shall be as made in accordance with the following schedule and as shown in the drawings:

Description	Qty	Width	Height	Fullness	Fabric Type	Lining
Main Curtain	2	26’-0”	16’-0”	100%	1	No
Leg Panels	6	10’-0”	16’-0”	50%	2	No
Border Panels	4	55’-0”	6’-0”	50%	2	No
Midstage and Rear Traveler Panels	4	26’-0”	16’-0”	50%	2	No
Cyclorama	1	50’-0”	17’-0”	Flat	3	No

B. Fabric types:

1. 24 to 25 oz 100% Polyester IFR Velour. Color: TBD by Architect
2. 24 to 25 oz 100% Polyester IFR Velour. Color: Black
3. Seamless IFR Muslin (Polyester). Color: White

C. Flame Retardancy: All fabrics shall be inherently flame-retardant meeting the requirements of National Fire Protection Association #701.

D. Fullness: See schedule in Section 3.06.A for fullness of each drapery.

1. Flat = no extra material.

2. 50 - 100% = additional fabric included, exclusive of turnbacks and hems.

E. Seams: Seams between strips shall be single stitched without puckers using thread of matching color. All fabrics with a grain or pile shall have all strips running in the "up" direction.

F. Pleats: Pleats shall be box type on 12" centers. Valances and borders (if provided with fullness) are to have their pleats arranged to conceal the seams.

G. Top Finishes:

1. 3-1/2" jute webbing shall be double stitched to the top of the drapery with 1" of face fabric turned under the webbing. Brass rustproof #4 grommets shall be inserted in pleat centers (12" centers on flat draperies).

2. The Main Curtain, travelers, legs, cyclorama, and any other draperies installed on tracks shall be supplied with plated CCF-2 drapery to carrier snap hooks.

3. Draperies tied directly to pipe battens shall be supplied with 36" braided #4 cotton tie lines. Tie lines shall be black or white to best match the draperies with the centerline in alternate color to aid in hanging draperies.

H. Bottom Hems:

1. All velour draperies and borders shall have 6" bottom hems complete with separate interior chain pockets filled with #8 plated jack chains. Chain pockets shall be stitched so that the chain will ride 2" above the finished bottom edge of the drapery. LEAD WEIGHT TAPE SHALL NOT BE PERMITTED.

I. Side Hems:

1. The Main Curtain and travelers shall have a minimum 1/2 width of face fabric turned back at the leading edge.

2. All other side hems shall be a minimum of 4".

3. Labels: Labels shall be affixed to the bottom of each piece on an offstage end identifying compliance with NFPA 701 flame retardancy requirements, piece size, manufacturer's name, address and phone number, and date of manufacture.

4.00 EXECUTION

4.01 INSTALLATION

A. Storage: The Contractor shall be responsible for storage of stage equipment, tools, and its equipment during the period of the installation.

B. Damage Protection: The Stage Rigging Contactor shall take all precautions necessary to prevent damage to the stage floor, walls, and all other existing finishes during installation.

C. Installation Personnel:

1. All specified equipment shall be installed by fully trained superintendents and workers.

2. The Contractor shall provide a field supervisor who is ETCP (Entertainment Technician Certification Program) certified as a Theater Rigger.

D. Installation practices:

1. Installation practices shall be in accordance with Federal OSHA Safety and Health Standards and all local codes. Certified welders shall perform all field welding (if allowed in the general conditions or by project field conditions) in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1) and any other applicable local and state codes and regulations.

2. Equipment shall be installed in a workmanlike manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.

3. All turnbuckles, screw pin shackles, and other connection hardware utilizing rotational connections shall be "moused" (secured) with plastic electrical ties or stiff wire to prevent rotation after final adjusts are made.

E. Field Welding: All proposed field welding shall be described and submitted in detail in the form of sketches and/or drawings for review by the Architect/Engineer of Record/Engineer of Record.

F. Touch-Ups: Any welds or cuts shall be touched up to match disturbed finishes. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

4.02 CLEANUP AND PROTECTION

A. Site Clean Up and Other Protection: The Contractor shall be responsible for all clean up related to its work, including the removal of packing materials etc. and the protection of existing surfaces or equipment. Repairs to damage caused by the Contractor to any item or surface are the sole responsibility of the Contractor.

B. Protection of Installed Equipment: The equipment described in this section is considered to be finished equipment and is to be protected during and after installation from excessive dirt and damage caused by other work.

C. Equipment Cleaning: All equipment and the areas around the equipment shall be cleaned prior to final inspection and acceptance.

5.00 INSPECTION, TESTING, AND OWNER TRAINING

A. Progress Inspections: During the installation of equipment the Contractor shall arrange for access as necessary for inspection of equipment by the Architect and/or the Consultant upon reasonable timely notice.

B. Special Testing: If specifications, the Architect, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Architect timely notice of its readiness for inspection, and of dates of inspections to be made by other authorities.

C. Final Compliance Inspection, Systems Commissioning, and Testing:

1. Upon completing the installation of all equipment specified under this section, the Contractor shall notify the Architect, who will schedule an inspection. Contractor shall notify the Owner, Architect, and Theater Consultant of its readiness for this inspection, no less than two weeks in advance.

2. At the time of inspection, the Contractor shall furnish sufficient workers to operate all equipment and to perform such adjustments and tests as may be required by the Architect and/or their Consultants.
3. Any equipment, which fails to meet with approval, shall be repaired or replaced with suitable equipment. If determined by the Architect, the inspection may be re-scheduled and held under the same conditions as specified herein.
4. Any additional costs incurred by the Architect or their Consultants due to inspection re-scheduling because the work is incomplete or defective, or filed conditions are not conducive for an full and final inspection, shall be borne by the Contractor.
5. At the time of these inspections, no other work shall be performed in the auditorium and stage areas.
6. All temporary bracing, scaffolding, etc. shall be removed to permit full operation of, and access to, all equipment.
7. Final approval will be withheld until all systems have been thoroughly tested and found to be in first class operating condition in every particular.
8. Upon completion and approval of the work, the Stage Rigging Contactor shall remove all tools, excess supplies, and trash from the work areas. Any equipment supplied under this section, but not installed, shall be inventoried, cleaned, organized, and turned over to the Owner. The Contractor shall leave the stage and all work areas in a "broom clean" condition.

D. Owner Training and Manuals

1. Upon completion of the work, the Contractor shall submit detailed Operations and Maintenance Manuals including as-built shop drawings, equipment descriptions, any required certificates or warranties, and parts lists. Submit in quantities as required by the Architect.
2. Provide "hard" copies of Operations and Maintenance Manuals for the Owner, Architect/Engineer of Record and Consultants. The Contractor shall also provide CD-ROM's of any and all CAD drawings or other electronically produced submittal items. Submit in quantities and file formats as required by the Architect.
3. The Contractor shall fully review all system and equipment manuals with operating and maintenance personnel designated by the Owner and/or Architect. The Contactor shall also demonstrate and fully explain the maintenance and safe use and operation of all systems and equipment included in this section. The Contractor shall notify the Owner, Architect, and Theater Consultant of the time and place of this training, no less than two weeks in advance.

END OF THIS SECTION

SECTION 11 6155

STAGE LIGHTING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Special Conditions and Division-1 Specification sections, apply to work specified in this section.

B. Definitions: For this project, the following entities are referenced.

1. Warrensburg Central School District, Warrensburg, NY
2. Architect: BCA Architects and Engineers, Watertown, NY
3. Theatre Consultant: Scheu Consulting Services, Inc. Fayetteville, NY

1.2 RELATED WORK AND REQUIREMENTS

A. Section 11 6133 – Stage Rigging and Draperies

B. All other Division 26 work as it may relate to the auditorium and stage areas.

1.3 SCOPE

A. This section requires the fabrication, furnishing, delivery, installation and testing of production stage lighting systems as indicated on the drawings and specified herein.

B. The Contractor shall provide all materials, equipment, labor, tools, scaffolds, and incidentals necessary to perform the scope of work.

C. It is the intention of these specifications that the Contractor provides a professional quality, complete and properly operating system in every respect and detail.

D. The installation contractor shall examine the plans in detail to familiarize him with the scope of the work. Special attention shall be paid to reviewing all project electrical drawings, floor plans, conduit risers, and the like for locations and quantities of boxes and enclosures.

E. The Contractor shall assume full responsibility for a complete operating installation, in the required location, in accordance with the contract documents.

F. Coordinate fully with the Division 26 Contractor.

1.4 WORK INCLUDED

A. Without restricting volume or generality of above “Scope,” work to be performed under this section shall include, but not be limited to, the furnishing and installation of the following:

1. A computer-controlled stage and house lighting system with 24 each relays in a DMX/network controlled mains feed panel. Basis of design is Electronic Theatre Controls Unison Echo Relay Panel.

2. The design incorporates one (1) front of house position on a self-climbing hoist system (by Section 11 6133 contractor), four (4) house tormentor/ box boom positions on the side auditorium walls, and four (4) on stage lighting battens (stage rigging by Section 11 6133 contractor). Lighting network receptacles shall be located at each of the previously listed lighting positions.
3. There shall be two follow spotlights.
4. The stage lighting system consists of the relay panel, auxiliary rack, circuit distribution raceways, wire, a DMX-512 computer-based stage lighting console, 2 video displays, a console plug-in station, LED stage lighting fixtures, cables, accessories and spares. The system infrastructure will be CAT5/6 network based.
5. House Lighting Control shall consist of a backstage control station incorporated in a rack provided by the AV contractor, a control booth control station, and entry stations located at the auditorium exits.

B. The Contractor shall examine the plans in detail to familiarize himself with the scope of work.

C. The Contractor shall provide the required manufacturers' shop drawings.

D. The Contractor shall provide all the necessary specialty equipment for the complete lighting and dimming system installation as specified herein and shown on the drawings.

E. The Contractor shall coordinate the system control wire conduit and device locations with the Division 26 Contractor.

F. The Contractor shall deliver to the job site, and coordinate the installation of, the specialty equipment with the Division 26 Contractor.

G. The Contractor shall provide, install and terminate all system control wires.

H. The Contractor shall provide and install all system control devices.

I. The Contractor shall uncrate, assemble, lamp, hang and aim all the stage lighting fixtures as shown on the drawings.

J. The Contractor shall provide for the system activation.

K. The Contractor shall provide the system manuals.

L. The Contractor shall provide the system warranty.

M. It is The Contractor's responsibility to ensure that the system and all of the system components, fixtures, equipment, devices, wire, terminations, field assemblies (including custom assemblies), etc. pass all required inspections by the local authority having jurisdiction.

N. Procurement of all required permits.

1.5 WORK NOT INCLUDED

A. The following work, provided by the Electrical Contractor, has a significant impact on the scope of this work. The Contractor is responsible for the successful coordination of the following:

1. System conduit.

2. Installation and termination of Line supply.
3. Installation and termination of Load wire.
4. Relay panel and control rack installation.
5. Distribution installation.

1.6 CONTRACTOR'S QUALIFICATIONS:

A. Only qualified contractors shall be used.

B. The work of this section will be contracted to a single firm, referred to as The Contractor.

C. The Contractor shall be a lighting system contractor who regularly engages in the furnishing, installation and servicing of systems of similar nature, size, scope and complexity to that contemplated by this specification. The Contractor shall have done so for a period of not less than five years preceding the bid date.

D. The Contractor shall have maintained for the five years preceding the bid date, a suitably staffed and equipped service organization which has continuously offered maintenance and repair services for systems of the nature, size, scope and complexity to that contemplated by this specification.

E. The Contractor shall have on staff a factory trained field service agent, capable of system testing, commissioning and troubleshooting systems of the nature, size, scope and complexity to that contemplated by this specification.

F. The Contractor shall have on staff a qualified and competent lighting designer / engineer capable of designing systems of the nature, size, scope and complexity to that contemplated by this specification.

G. The Contractor shall maintain all required business and professional licenses and insurance for the duration of this contract.

H. The Contractor shall demonstrate to the satisfaction of the owner, through submittals presented in accordance with the project timetable, that The Contractor meets all the above qualifications. The minimum contractor qualification submittal shall include the following:

1. Statement of company history. Include a breakdown by percentage of gross sales of all business activities The Contractor is involved in for each of the last 5 years (e.g. system installation = 30%, expendable sales = 40%, equipment rentals = 20%, design and other professional services = 10%, etc).
2. Previous experience: Furnish a list of four installations of the type and size contemplated by these specifications, currently in use as originally installed, in which a theatre / system consultant was involved, completed in the last 5 years and the following information regarding each installation:
    a) Name and address of each installation facility.
    b) Facility owner and telephone number.
    c) Name, address, and phone number of a person regularly employed by the owner, who is familiar with the operation of the systems and who has no connection or business connections with The Contractor except as The Contractor shall fully disclose

d) Name, address, and phone number of the theatre / system consultant, along with the names of all the consultant's personal directly involved.

e) System shop drawing – These will be returned if The Contractor provides a call tag or return postage.

f) Owner's manual drawing – These will be returned if The Contractor provides a call tag or return postage.

g) System as-built drawings drawing – These will be returned if The Contractor provides a call tag or return postage.

h) List of contractors personal involved with each persons responsibility on the project.

i) Name, address and phone number of the general contractor, along with the names of all key GC personal directly involved.

j) Name address and phone number of the electrical contractor, along with the names of all key EC personal directly involved.

3. Statement of current company capabilities and ownership.

4. Key Personal: For each of the key personnel listed in the below; Include individual's name, title, and number of continuous years of service to contractor. Include a resume detailing industry experience, and role within organization (include only full-time/regular staff employees; not independent contractor, freelance, or temporary positions). List all industry certifications held, training courses attended, and continuing education credits, including dates of attendance.

   a) Project Manager

   b) Senior Technician

   c) Service Manage

5. Factory Trained Field Service Agent. Include individual's name and title. List all factory held certifications, training courses attended, and continuing education credits, including dates of attendance. Provide a list of recently commissioned systems, scope of project, and commissioning dates.

6. Lighting Designer / Engineer. Include individual's name and title. List current design credits with scope of project, and design completion dates.

7. Other Department Staff. Include size of staff and experience of each staff member.

8. Replacement and Spare Parts Inventory – Provide detailed list of primary replacement parts, components, and spares typically held in inventory.

9. Test Equipment and Physical Plant – Include an inventory of all test facility equipment owned and used regularly by the Service Department. Provide description of physical plant and space utilization.

10. Copies of all business and professional licenses and insurance certificates.

PART 2 - PRODUCTS

2.1 RELATED DOCUMENTS

A. When this document lists several acceptable manufacturers for a particular item of equipment, more than one of which is to be provided, The Contractor shall furnish all of those similar items of equipment from one manufacturer.

B. All dimmer racks, dimmer modules, lighting controls and lighting consoles shall be from the same manufacturer.

C. Any item of equipment or hardware that may not be specifically shown on the drawings or specified herein, but required for proper system operation or installation, shall be furnished and installed and be of the highest quality available.

D. All materials and equipment used in this project shall be new, unused and of the latest models and design. Refurbished materials and equipment are not permitted except where noted.

E. The performance of all equipment must meet the most recently published manufacture's data sheet

F. UL Labels: All equipment, where applicable standards have been established, shall be listed by Underwriters' Laboratories, Inc., and shall bear UL label when delivered to the job.

G. If so required by the local authority having jurisdiction, anything not arriving at the job bearing a UL label shall be field inspected and label by a nationally recognized testing laboratory recognized and approved by the local authority having jurisdiction.

2.2 ACCEPTABLE MANUFACTURERS

A. The stage lighting and control manufacturer shall be one who has been continuously engaged in the manufacture of stage lighting control equipment, wiring devices, and electronic dimmers for ten years or more.

B. Except where otherwise noted in this specification, the following are the approved manufacturers for the listed respective products:

Altman Lighting Inc.
57 Alexander Street
Yonkers, NY 10701
(914) 476-7987

Canto USA
1092 West Atlanta Street, SE Suite 600
Marietta, GA 30060
(888) 252-5912

Chauvet Professional
5200 N.W. 108th Avenue
Sunrise, FL 33351
(954) 577-4455

Elation Professional
13185 NW 47th Avenue
Opa-Locka, FL 33054
(866) 245-6726

Electronic Theatre Controls, Inc.
3030 Laura Lane
Middleton, WI 53562
(800) 688-4116

LEX Products Corp.
401 Shippan Avenue
Stamford, CT 06902
(800) 643-4460

Lycian Stage Lighting
PO Box D
Kings Hwy
Sugar Loaf, NY 10981-0214
(845) 469-2285

LynTec
8401 Melrose
Lenexa, KA 66214
(913) 529-2233

Middle Atlantic Products, Inc.
North Corporate Drive
Riverdale, NJ 07457
(973) 839-1011

Pathway Connectivity
Acuity Brands Lighting
#103- 143917th Ave SE
Calgary AB T2G1J9, Canada
403-243-8110

Phillips/Strand Lighting, Inc.
10911 Petal St.
Dallas, TX 75238
813-334-4189

Robert Juliat USA
48 Capital Dr.
Wallingford, CT 06492
(203) 294-0481

SSRC
11 Freedom Court
Greer, South Carolina 29650
(864) 848-9770

Strong Entertainment Lighting
4350 McKinley Street
Omaha, NE 68112
(402) 453-4444

C. Alternatives: In no case will equipment or materials of lesser design or workmanship be acceptable. Only those materials and equipment listed in this specification will be considered unless prior approval is sought and received.

1. Substitutions: When a specific piece of equipment specified has been discontinued and/or replaced by a new model, substitution will be acceptable when:

   a) Submission of complete data on the new model or substitute has been approved by the owner prior to equipment acquisition.

   b) Substitute equipment or the replacement of rejected equipment shall be at the sole expense of The Contractor.

2. Substitutes shall be considered only when they are submitted fourteen days prior to bid date, and are accompanied by sufficient catalog data, specifications, and technical information for evaluation.

   a) Summarize proposal with a list of equipment catalog or series numbers. Substitute bids shall include a system riser diagram detailing components and any deviation of functionality from the drawings and specifications herein.

   b) The bidder shall include the name, address, and phone number of at least two- (2) factory authorized Field Warranty centers within a 250-mile radius of the job site as a part of the submittal documents.

   c) On the lighting fixtures, the bidder submitting other equipment shall include performance data taken and reported in compliance with the "Recommended Practice for Reporting Photometric Performance of Incandescent Filament Lighting Units used in Theatre and Television Production," approved as the official standard by the U.S. Institute for Theatre Technology, the Illuminating Engineering Society, the Society of Motion Picture and Television Engineers, and the American Theatre Association. For purposes of establishing the validity of such submissions, the manufacturer shall furnish this data from an independent testing laboratory. Proposals that fail to meet this requirement shall not be considered.

   d) On the dimming system, the bidder submitting other equipment shall include pertinent performance data, charts and drawings showing in what respect the system will function in accordance with specification, and in what way it will deviate from the specification. This submittal shall include, but not be limited to the following:

      1) Rated ampacity, peak single cycle surge current rating, I^2t rating, and transient voltage rating of the output devices employed in the dimmers.

      2) Laboratory verification of minimum current rise time at a 90-degree conductive angle, with the dimmer operating at the maximum load.

3) Description of the air-cooling and air filtration systems.

4) Description of the packaging and ease of replacement for all spare parts required in this specification.

5) Original Manufacturer's catalog data sheets for all major components of the dimmer system.

e) On the control system, the bidder shall submit the name of the manufacturer, and list of ten (10) or more operating systems in the State of New York of the type specified which meet the performance control functions designed, with contact names and telephone numbers for references. This information shall be mandatory as a basis for determining the bidder's intent in meeting the full requirements of this specification, and shall be submitted at least fourteen days in advance of bidding.

f) It is understood that any additions or revisions of wiring required by the use of substitute equipment, whether such wiring is part of this contract or of the prime electrical contract, shall be the responsibility of the bidder making the substitution.

g) If required by the Owner, the Consultant, or Architect, the bidder shall provide working samples of substitute equipment including lamps for any lighting fixtures, to be delivered to the premises designated, for examination by Architects, Consultants, and such representatives as the Owner may direct. Handling, shipping and delivery to, or removal from site, of any sample required shall be at the cost of The Contractor. The Contractor shall be responsible for the arrangement of the cost of the electrical supply required to properly test any lighting instruments or item of equipment. Proposals which fail to address specification requirements or review comments will be rejected.

h) Prior approval submittal review and approval shall not be considered to be shop drawing review. Prior approval in no way relieves The Contractor of responsibility to fully meet the requirements and intent of this specification.

i) Should the Contractor proposed and receive approval for the use of alternative or substitute equipment which requires additional or modified conduit, The Contractor will be solely responsible for the installation of such conduit.

2.3 RELAY PANEL AND LOAD CENTER

A. General

1. The wall mount relay panel shall be the Echo Relay Panel as manufactured by ETC, Inc., or equal
2. Relay Panels shall be UL508, UL67, and UL924 Listed, and shall be so labeled when delivered
3. Relay Panels shall consist of a main enclosure with 30 pole breaker subpanel, relay/dimmer sub panel, integral control electronics, and a low voltage subpanel for data terminations and provision for accessory cards

    a. Up to two accessory cards shall be supported per relay panel

B. Mechanical

1. The panel shall be constructed of 16-gauge steel. All panel components shall be properly treated and finished in fine-textured, scratch resistant paint
2. Relay panels shall be available in 120 and 277 Volt AC configurations
    a. 120V enclosures shall be 67.5” high by 14.36” wide and 4” deep with a weight not more than 80 pounds
    b. 277V enclosures shall be 67.5” high by 20” wide and 6” deep with a weight not more than 130 pounds
3. The panel shall be capable of being mounted on the surface of a wall or recessed mounted
    a. 120VAC panels shall support mounting between standard wall stud framing (16-inch on center spacing)
4. Choice of panel covers shall be available for surface or recess mount applications. This outer panel shall ship complete with a locking door to limit access to electronics and breakers, breakers. Recess mount doors shall extend 1” beyond all panel edges to hide wall cut-out
5. The unit shall provide interior cover over breaker panel to allow access only to class 2 wiring and prevent direct access to class 1 line voltage components
6. The Relay panel shall support up to twenty-four 20-amp single pole circuits made up of relays. Two and three-pole relay circuits shall be supported at decreased density where each pole constitutes one of the available single-pole circuits. Mixing of circuits in any combination shall be supported
7. Relays shall include integral switches for manual control while power is unavailable to the panel such that critical lighting can be set to an on state, without the need for power to the panel
8. Relay output lugs shall accept 6-14AWG copper wire
9. Breaker subpanel may include up to twenty-nine 20-amp single pole, up to fourteen 20 amp double pole, or nine three pole breakers as required in any combination up to capacity
10. Control wiring for DMX, station bus, and Emergency input terminations shall land on removable headers for contractor installation.

C. User Interface

1. The user interface shall contain a graphical display with button pad to include 0-9 number entry, up, down back arrow navigation and enter
2. Test shortcut button shall be available for local activation of preset, sequence and set level overrides
3. The user interface shall have a power status LED indicator (Blue), a DMX status LED indicator (Green), a network status LED indicator (Green) and an LED indicator (red) for errors
4. Interface shall allow the backlight to timeout and shall provide user editable options to shut off backlight completely as well as adjust screen contrast
5. Ethernet interface shall default to automatic IP through link local and DHCP. Upon receiving IP address, the address of the Network Interface Card (NIC) shall display in the about menu. Static address and settings shall also be possible
6. The control interface shall support a USB memory stick interface for uploads of configurations and software updates

D. Functional

1. Panel setup shall be user programmable. The control interface shall provide the following relay setup features (per circuit):
    a. Type (1 pole, 2 pole, or 3 pole)
    b. Name
    c. Circuit Number
    d. DMX address
    e. sACN address
    f. Space Number
    g. Circuit Modes
        1) Normal (priority and HTP based activation and dimming)
        2) Latch-lock
        3) Fluorescent
        4) DALI
    h. On threshold level
    i. Off threshold level
    j. Include in UL924 emergency activation
    k. Allow Manual
2. Relay panels shall support discrete addressing of each relay. Panels that are restricted to use of start address with sequential addressing and cannot assign each 0-10V output control to any internal relay shall not be acceptable
3. The panel shall be capable of switching all relays on or off at once, or in a user-selectable delay per relay using a period of 0.1 to 60 seconds, in 0.1 second increments
4. An Ethernet connection shall provide advanced control of relays over streaming ACN (sACN) and transmit status, control override, and measured energy usage per branch circuit via an internal Web UI or central monitoring interface
    a. Control electronics shall report the following information per branch circuit.
        1) Breaker state (On/Off)
        2) Breaker state (Open/Closed)
        3) Current draw (In Amps)
        4) Voltage
        5) Energy usage
    b. Panels that do not report this information shall not be acceptable.
5. Built-in Control shall include:
    a. Ability to record up to 16 presets in each space from the control panel, connected control stations, or timed events
    b. Presets shall be programmable by recording current levels (as set by DMX or connected control stations), by entering levels on the control panel directly, manually selecting relay state on each relay or a combination of these methods. From the control panel, stations, or timed events it shall be possible to record values for up to 16 zones per space
    c. Up to 8 spaces in a single rack for total of up to 16 spaces shall be supported per system or system subnet
    d. Indication of an active preset shall be visible on the control panel display
    e. One 16-step sequence per space for power up and power down routines
    f. The panel shall have a UL924-listed contact input for use in Emergency

Lighting systems. The panel shall respond to the contact input by setting included relays to "on", while setting non-emergency relays "off". Each relay can be selected for activation upon contact input

g. Upon Data loss the system shall provide options to hold last look infinitely or hold for a configured time period set by the installing technician then fade/switch to the input of the next available priority
h. Control electronics shall respond directly to control stations for zone, preset, and sequence control. Systems that require secondary control systems for this functionality are not acceptable
i. After power loss, electronics shall be capable of holding the system in its previous state until new level data (DMX, architectural presets, sequences and zones, or local overrides) is received to make each relay change state

6. The control of lighting and associated systems via real time and Astronomical clock controls

a. The relay panel shall allow the activation of presets, sequence, and zone programming of up to 50 time clock events via a built in real and astronomical timeclock
b. System time events shall be programmable via the control panel.

1) Time clock events shall be assigned to system day types. Standard day types include: everyday, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday
2) Time clock events shall be activated based on sunrise, sunset, time of day or periodic event
3) System shall automatically compensate for regions using a fully configurable daylight saving time
4) Presets shall be assigned to events at the time clock

c. The time clock shall support event override

1) It shall be possible to override the timed event schedule form the face panel of the time clock

d. The time clock shall support timed event hold

1) It shall be possible to hold a timed event from the face panel of the processor
2) Timed event hold shall meet California Title 24 requirements

7. The panel shall receive ESTA DMX512-A control protocol. Addressing shall be set via the user interface button keypad with any relay being patched to any DMX control address

a. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components
b. The relays shall respond to control changes (DMX or Stations) in less than 25 milliseconds. DMX512 update speed shall be 40Hz
c. Setting changes shall be able to be made across all, some, or just one selected relay in a single action from the face panel
d. DMX data loss shall allow for levels/relays to be held for ever or for a specified time before switching to a lower priority source
e. Initial Panel setup

1) The relay panel shall automatically detect the type of relay installed in each location without need for manual configuration of the physical arrangement.
2) Quick rack setup shall be available to apply address settings across all circuits for rack number, DMX Start Address, sACN universe, and sACN start address.
3) Emergency Setup Menu shall provide optional delays when emergency is activated or deactivated, and option to turn off non-emergency circuits shall be available. Record function shall allow circuits that are turned on to be added to the emergency setting

E. Electrical

1. Relay Panels shall be available to support power input from:

a. 120/208V three phase 4-wire plus ground
b. 120/240V single phase 3-wire plus ground
c. 277/480V, 230/400V and 240/415V three phase. 4-wire plus ground

2. Conduit Entry:

a. Feeders:

1) Top or top-side (upper 6” of either side)
2) Bottom or bottom-side 6” of either side
3) Feeders shall enter through the top or bottom according to the orientation of the enclosure
4) Feeder entry shall be nearest to the location of the feeder lugs or main breaker

b. Load:

1) Load wiring shall enter through the top or bottom of the enclosure
2) Load wiring shall enter through the top/bottom surface nearest to the breaker sub panel
3) Load wiring may also enter through left and/or right side provided a low voltage chase is not required through the same area. If class 2 chase is required, a field installable barrier panel shall be provided upon request. When installed, the left or right side of the panel, where the barrier has been installed, shall not permit load wiring

c. Low Voltage:

1) Top or top-side (upper 6” of either side)
2) Bottom or bottom-side (bottom 6” of either side)
3) For low voltage conduit entry at the relay end of the cabinet, conduits shall be located at the outer 3” of the top/bottom panel
4) Field installed low voltage channel shall be provided separately for installation on the left or right side of the panel to allow class 2 wiring to traverse the panel from top to bottom or bottom to top

3. All relays shall be mechanically latching
4. The relay shall be capable of switching 20A at up to 300V
5. The relay panel shall support a maximum feed size of 200 Amps
6. Relay panels shall support main circuit breaker options:

a. Main breaker options shall be optional and available for purchase upon request
b. Main breakers shall be field installable
c. Main breakers shall be available in 100 and 200 Amps for 120V systems and 150 Amps for 277V systems
d. Series rated SCCR ratings apply as follows with appropriate main breaker:

1) 22,000A at 120/240V
2) 10,000A at 100A; 120/208V
3) 10,000A, 22,000 or 42,000 at 200A; 120/208V
4) 14,000A at 150A and 200A; 277V/480V
5) 65,000A at 200A; 277V/480V

e. Main breakers shall allow the following range of wire sizes:

1) 1AWG-300kcmil at 120/240V
2) 3/0 to 300kcmil at 120/208V
3) 6AWG-300kcmil at 277V/480V

F. Relay

1. Each relay shall have a manual override switch with on/off status indication
2. Relays shall be rated for use with:

a. 16A Electronic Ballast loads @ 120, 240 and 277V
b. 20A Tungsten loads at 120, 240, and 277V
c. 20A 277V Ballast (HID)
d. Motor loads with ratings of 20 FLA @ 120V, 17 FLA @ 240V, and 14 FLA @ 277V 100,000A symmetrical SCCR

3. Isolation shall be 4000V RMS
4. Relays shall be latching state
5. Rated Life:

a. 1,000,000 mechanical activations
b. 100,000 cycles at full resistive load
c. 30,000 cycles full motor, inductive, tungsten, and electronic (LED)
d. Decreasing loading shall increase the rated life of the relay inversely proportional the square of the load

6. Relays shall support reporting of current usage with an accuracy of five percent of the connected load

G. Relay Panel Accessories

1. A low voltage 0-10V dimming option shall provide up to 24 0-10v control outputs that are linked to relay circuits within the panel. Each output shall support up to 400mA of current sink per output
2. A contact input option shall provide 24 dry contact inputs to be linked for direct or group relay control, to activate a preset, or to activate a sequence. Controller software shall allow for normally open maintained, normally closed maintained, or momentary toggle
3. A DALI control option shall provide 24 control loops of broadcast DALI control, with each loop controlling up to 64 DALI devices
4. A RideThru option shall provide short-term power backup of control electronics by automatically engaging when power is lost, and recharging when normal power is present

5. A tamperproof hardware kit shall be available that provides center reject Torx head screws to prevent access to panel interior by unqualified individuals

H. Main Breaker options shall be available as specified in Section E.6 Thermal

1. The panel shall be convection cooled. Panels that require the use of cooling fans shall not be acceptable
2. The panel shall operate safely in an environment having an ambient temperature between 32ºF (0ºC) and 104ºF (40°C), and humidity between 5-95% non-condensing

2.4 LIGHTING CONSOLE

1. Furnish the quantity of main lighting control consoles and accessories from one of the following approved manufacturers:

   Electronic Theatre Controls, Inc.

QTY.	CAT. #	DESCRIPTION
1	Ion Xe 20 – 12K	Ion Xe 20 with 12,288 output configuration, include off line editor software
1	Eos FW 20	Eos standard wader wing 20
1	-	Road case for all above
1	-	10’ Network cable (console)
1	-	10’ DMX cable
1	-	Dust cover(s) for console.
2	-	19” LCD Screen Monitors
2	-	19” monitor dust cover
1	-	10’ Network cable (console)
1	-	10’ DMX cable
1	-	Wireless Handheld remote control unit
1	2 kVA UPS	Uninterrupted Power Source
1	-	Controller mini keyboard
1	-	Controller mouse
2	Littlite	Task lights

2. Strand Lighting Inc.

QTY.	CAT. #	DESCRIPTION
1	91001	NEO Lighting Control Console w/ 1 universe of DMX
3	91002	1 each additional universe of DMX
1	-	Road case for above
2	91021	19” LCD Screen Monitors
1	65100	NODE-2 SN 100 Network Node – portable

1	-	10’ Network cable (portable node)
1	-	10’ Network cable (console)
1	-	10’ DMX cable
1	-	Wireless Handheld remote control unit
2	-	19” monitor dust cover
1	2 kVA UPS	Uninterrupted Power Source
1	-	Controller mini keyboard
1	-	Controller mouse
2	Littlite	Task lights
2	-	6’ extension cable
2	-	6 receptacle power strip

2.5 STAGE LIGHTING CONTROL CONNECTION PLATES

A. The system will be accessible via interconnection plates for the lighting control console. Ethernet output receptacles are located at the performance lighting positions. Furnish lighting plugging stations; see contract drawings for type, quantities and locations.

2.6 HOUSE LIGHT CONTROL

A. General Description

1. Control shall be low-voltage type as specified here and as listed below and/or shown on the drawings. Controls shall use low-voltage Class II electrical wiring. All controls shall be able to access and control house light relays.

2. Furnish and install the following equipment and accessories; see system one line for quantities and the device location drawing for placement.

   Electronic Theatre Controls, Inc.

CAT. #	DESCRIPTION
PI1004-_	Flush mount 4 Button entry station. Coordinate station color with architect.
P-TS7-PE	Pendant style touchscreen Master control station (NetConnect/Ethernet) - Booth
P-TS7-4 (Black) w/ P-LCD-LC-4 Black Locking Cover	Wall/surface mount style touchscreen Master control station – Downstage right

3. Electronic Theatre Controls is the basis for design. Other acceptable manufacturers are Strand Lighting and Pathway Connectivity.

2.7 DMX DISTRIBUTION & ETHERNET WIRING

A. Furnish equipment as shown on system drawing.

B. Install a certified CAT6 network.

1. All branches will be fully tested and documented using a Certified CAT 6 tester.
2. All Components (wire, connectors, inline couplers, patch bay, patch cords, etc.) shall be fully CAT 6 compliant.

C. Install the following hardware (when quantities above those shown on the system drawing are called for, those extras shall be furnished as loose equipment);

1. DMX/RDM Four port Gateway configured as input node
   a) ETC N34G-4M
   b) ETC is the basis for design, acceptable manufacturers are Strand Lighting and Pathport.
2. SWITCH-1 32 port minimum managed gigabit network switch with PoE. PoE power to be sufficient to support all devices that are connected.
   a) 3Com or similar
3. PBY-1 Network Patch bay 32 port RJ45. Provide required number of modular outlets. Include labeling.
   a) Siemon HD5-series or similar.
4. Wireless Access Point (WAP) with single point Setup.
   a) Cisco WAP 121 Wireless-N Access point or equal.
5. One (1) DMX Opto-Splitter for house lighting fixtures
   a) Pathway DMX Repeater Pro or equal.
6. Uninterrupted Power Supply - rack mount
   a) Uninterrupted power supply 120v input/120v output, extended runtime model with switched outlet groups to connect critical equipment to a switched outlet group configured to turn on immediately in the event of a power outage and to connect peripheral equipment to a group configured to shut down, after a short period, in the event of a power outage in order to conserve battery run time (Middle Atlantic UPS-2200R or approved equal)
   b) External Battery pack (Middle Atlantic UPS-EBPR or approved equal).
7. Twenty four (24) 3’ CAT 6 patch cords
   a) Black Box EVSA85-000 or similar.
8. Portable Nodes
   a) DMX portable nodes with c-clamp and safety cable to distribute DMX over Ethernet with any compatible input or output device. Supports CAN, RDM, and USITT DMX 512-A, compliant with 802.af for Power over Ethernet, flexible output patch to allow a 512 address universe to begin at any output address. Fabricated from 16 gauge cold roll steel finished in black, fine textured scratch resistant powder coat, two integrated DMX 5 pin out ports, back lit LCD display for identification. Front and rear power indicators and RJ45 receptacle for connection to the lighting network.
   b) ETC NET 3 two port gateway tour is the basis of design; alternative manufacturers are Strand Lighting and Pathport

9. One wall mount equipment rack for Auxiliary Rack 1. Furnish swing open access wall mount auxiliary rack as indicated on drawing. Furnish rack back box to electrical contractor and coordinate instillation. Provide internal power as required. Fill all unused rack spaces with blank panels.

   a) AUX-1: Middle Atlantic Products DWR-24-32 with FD-24 front door.

   b) Furnish and install the following equipment in the AUX-1 rack see contract drawings for location:

QTY.	DESCRIPTION
1	Panel lights with dimmer.
1	Uninterrupted power supply (described above)
1	Uninterrupted power supply battery pack (described above)
1	Four port Gateway / input (described above)
1	DMX splitter(described above)
1	Network switch (described above)
1	Network patch bay (described above)
1	4u locking drawer
	Brush panels as needed
	Blanks As needed

   c) Middle Atlantic is the basis for rack design; acceptable manufacturers are Hoffman, and Rittal.

2.8 STAGE LIGHTING CONNECTOR STRIPS

A. This assembly shall be fabricated of 16-gauge, cold-rolled steel with removable covers and shall be 4" x 4" in cross section in lengths specified herein. Terminal strips shall be supplied for feed conduit and wire extending to flush mount NEMA 5-20R female receptacles. Strip finish shall be fine-texture, scratch resistant, black powder-coat. One steel hanging bracket shall be supplied for each 5-foot section of connector strip. The terminal blocks shall be a barrier screw clamp type. Strips with 12 or more circuits shall have terminals located in an auxiliary terminal box sized as specified. Outlets shall be identified by 2" high black on white numerals. Wire nuts and crimped connectors are not acceptable. The entire connector strip assembly shall be UL listed and labeled. Basis of design is SSRC equal by ETC or Strand

B. See distribution detail drawing for circuit designations and see device location drawing for locations.

2.9 STAGE THEATRICAL LIGHTING FIXTURES

A. All theatrical lighting fixtures are to include a C-clamp, a color frame, a safety cable w/spring clip, 36” 3-wire leads and NEMA 5-20R male connectors installed except where noted differently

B. Furnish and install the following theatrical lighting fixtures in the auditorium: see light plot for quantities.

CAT.#	DESCRIPTION
Electronic Theatre Controls, Inc. ColorSource Spot, Cat # CSSPPOTS OR Strand Lighting, Inc. Cat. # PLPF4MKII-03-26 OR Altman Cat #PHX1RGBW26B	Twenty six (26) degree, LED ellipsoidal reflector spotlights.
Electronic Theatre Controls, Inc. ColorSource Spot, Cat # CSSPPOTS OR Strand Lighting, Inc. Cat. # PLPF4MKII-03-50 OR Altman Cat #PHX1RGBW50B	Fifty (50) degree LED ellipsoidal reflector spotlights.
Chauvet Professional Ovation B-565FC OR Equal by Stand, Altman, or ETC	LED wash/cyc light
Canto 200 OR equal by Robert Juliat, Lycian, or Strong	LED Follow spot Include base and color boomerang

PART 3 - EXECUTION

3.1 INSPECTION AND TESTING

A. Comply with all local building codes.

B. In the absence of specific local codes, comply with the National Electrical Code (NFPA-70) as applicable to installation and construction of stage lighting and control equipment.

C. Where not in conflict with local building codes or the National Electrical Code comply with industry standard professional practices.

D. Installation practices shall be in accordance with OSHA Safety and Health Standards.

3.2 SHOP DRAWINGS

A. Submit within thirty (30) days of the bid acceptance, for review and approval by the Owner, Architect, and Consultant:

1. Complete shop drawings and data sheets for all items specified.
2. Complete shop drawings for all components, assemblies, sub-assemblies, cabinets, wiring devices and hardware required to implement the work.
3. Riser diagrams showing all quantities, types and sizes of inter-connection wires to be installed by others.
4. Schematics of all block assemblies and sub-assemblies, including pin out identification of all low voltage cable connectors.
5. Approval of shop drawings does not relieve The Contractor of the responsibility of providing equipment in accordance with these specifications. Any deviations from the specifications shall be "starred" and noted in 1/4" high letters. Only deviations, which upgrade the quality of the equipment, shall be considered.

6. In addition to drawings, the Contractor may elect to submit catalog cuts for certain standard equipment items. These shall contain full information on dimensions, construction, applications, etc. to permit proper evaluation. In addition, they shall be properly identified as to their intended use and any options or variations shall be clearly noted.
7. Samples may be requested by the Architect and shall be furnished for inspection at the Architect's office, at the Contractor's sole expense.
8. Prior to the commencement of fabrication and delivery, the Contractor shall submit for approval, to the Architect, an outline of a proposed commencement and completion schedule of project requirements.

3.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver stage lighting equipment and controls to job site securely wrapped in containers.

B. Coordinate delivery dates with the Division 26 contractor

C. All equipment shall be stored in a clean, dry space.

D. Discrepancies in quantities or missing equipment shall be noted, in writing, and brought to the attention of the manufacturer within five days of receipt.

E. Replacement of missing or damaged equipment shall be the responsibility of the Contractor.

F. Handle equipment and controls carefully to prevent breakage, denting and scoring finish.

G. Replace and return damaged units to equipment manufacturer immediately.

H. Store in original cartons and protect from dirt, physical damage, weather, and construction traffic.

3.4 INSTALLATION

A. The Contractor shall furnish, deliver, install and terminate all system control wires.

1. All cables shall be permanently labeled at every termination. The label shall not be hand written. Clear heat shrink shall cover the label.
2. Service loops of not less than 6" will be present at all terminations to equipment.
3. All pulls to be made be hand, care will be taken not to nick cable jackets, and any nicked or damaged cable will be replaced.
4. A pull string will be left in all conduits after wire is installed.
5. NO SPLICES WHATSOEVER IN CONDUIT!
6. Include spare cables with all field runs. Quantity to be 10% or 1 whichever is greater unless otherwise specified.
7. Where shielded cable is in use leave shield drain wire the same length as the circuit conductor(s), sleeve shield drain wire in green pvc tubing. Cap where the cable jacket was removed with heat shrink. Where the shield drain wire is to be lifted follow the above and fold back over cable jacket. Then cap end with heat shrink. Do not use a single piece of heat shrink for this use two smaller ones.
8. All soldering will be clean and neat and not exhibit evidence of a " cold" joint, were necessary heat sinks will be used. Use only rosin core "electronic type” solder.
9. Wire nuts will be not allowed.

B. The Contractor shall furnish and install all system control devices.

C. The Contractor shall hang and aim the stage fixture hanging plot.

1. Provide the Theatre Consultant fourteen (14) days' notice prior to this work being scheduled.

2. The Theatre Consultant shall verify the aiming of the stage fixtures.

3. The installation of all work shall be neat.

D. All boxes, equipment, etc., shall be plumb and square.

E. The installation shall conform to the plans and spec.

F. The Contractor shall not commence the installation of equipment and devices, other than the pulling of cable, until all areas are clean, painted and finished to a point that they are completely dust, dirt, lint, fiber and airborne particle free. The air conditioning system must be operating to its design level and be able to keep all areas with control equipment stable.

3.5 INSTALLATION COORDINATION

A. The Contractor shall specifically coordinate the placement and sizes of conduit relating to this work and shall specifically review and approve the conduit rough-in in time to advise all parties of needed changes, omissions, etc.

B. The Contractor shall report this successful coordination in writing to the Architect.

C. If any conflicts or omissions occur as a result of the Contractor's unsuccessful coordination of the above-mentioned work, it shall be the Contractor's responsibility to correct, furnish and install any additional material that may be required.

D. The Contractor shall coordinate his work with the other trades at all times to ensure smooth progress of work and satisfactory final results.

E. The Contractor shall examine areas and conditions under which stage lighting and controls are to be installed and notify the Architect in writing of conditions detrimental to proper installation and operation.

3.6 INSPECTION AND TESTING

A. During the installation of the equipment the Contractor shall arrange for access as necessary for inspection of equipment by the owner's and/or architect's representatives.

B. Provide a safe means of accessing all system components for all visits.

C. Equipment Pretesting: All racks are to be built and wired in contractors shop and tested prior to delivery to site. All other equipment is to be tested prior to delivery and installation. A written test report will be submitted to the owner.

D. Final Inspection:

1. The final inspection will confirm that the systems, as installed, meet the requirements of this spec, the contract documents, and the approved contractor's shop drawing and submittals.

2. The Contractor will inform the owner in writing of the system's completion. The Contractor will then request final inspection by the consultant, and carry out the necessary coordination. This coordination includes:

a) Giving at least fourteen days' notice to the consultant prior to the final inspection.

b) Arranging for the Contractor's and consultant's exclusive use of the space.

c) Arranging for a HVAC technician to be available to turn the AC system on and off as required.

d) Arranging for a sound technician to be available to control the sound system as required.

e) The Contractor's job foreman and one additional worker familiar with the job will be present during all check out, testing and inspection.

3. Contractor will complete the following tasks prior to consultant's arrival:

a) Unpack and assemble all portable equipment.

b) Place all portable equipment in one location.

c) If anything has been turned over to the owner have the signed Letters of Transmittal on site.

d) Complete all required paperwork (pre-testing reports, letters indicating successful coordination of the installation, etc.).

e) Remove all security covers.

f) Contractor will provide all necessary software, cables, and interfaces to facilitate the setting of computer controlled, remote controlled or digitally controlled equipment.

4. Contractor will provide the following test equipment for use during inspection and acceptance testing:

a) Some type of light meter

b) Some type of DMX checking device

c) Some type of Multi-meter.

d) Contractor will provide safe means to access all system components during the entire commissioning process.

e) Contractor shall provide personal and equipment to make any adjustments to the theatrical lighting system(s), as well as to correct problems, for the entire inspection and testing period.

E. The Theatre Consultant or his representative will conduct all final system tests in order to determine final acceptance.

F. In no event shall the theatrical lighting systems installation be submitted for final approval or acceptance until any and all elements of the facility that may have a bearing on the system performance, including but not limited to doors, windows, HVAC, carpeting, furniture, wall coverings, stage flooring, rigging systems, interior design elements, architectural lighting and lighting control systems have been completed and are operable. All elements that may affect stage lighting systems operation or performance shall be "on" and operating during adjustments. The stage lighting contractor will be responsible for coordinating the requirements of this paragraph with other work on the project.

G. Equipment Backorders. Should any component or equipment be on backorder at time of system inspection and testing, the Contractor shall provide comparable loaner equipment, with loaner

equipment provided at contractor's expense. Said equipment shall remain on-site until backordered equipment is delivered and installed.

3.7 MANUFACTURER'S SERVICES

A. The Contractor shall provide for:

1. A manufacturer's field service engineer to perform initial system activation. Under no circumstances shall power be applied to any equipment prior to initial system activation.
2. The manufacturer's field service engineer shall inspect and confirm that all low voltage terminations are correct.
3. Such engineering services shall be furnished within twenty-one (21) days of a written request by The Contractor.

3.8 TRAINING AND INSTRUCTION

A. The Contractor shall furnish sixteen (16) hours of onsite instruction to Owner designated persons. This instruction shall happen on four occasions. The general conditions require all training sessions to be videotaped. This contractor is to coordinate with this requirement and if required perform the taping.

1. The first occasion shall take place at the time of initial system activation and be performed by the manufacturer's field service engineer. The duration of this occasion shall be not less than three (3) hours. This instruction shall cover all aspects of operation and maintenance required by this system.
2. All other occasions shall be coordinated with the owner representative and Contractor with (21) days written notice. This instruction shall be an overall review of the system operation and detailed console operations. The finial occasion shall take place within the first six months following system activation.

B. Provide operational assistance for the first usage of the system. This is to be on the owner's time schedule but, not to exceed 8 hours.

3.9 MANUALS

A. Upon completion of the work, the Contractor shall submit four detailed printed copies of Operations and Maintenance Manuals for each space, 2 for the Owner, and 1 for the Architect/Engineer of Record and one for Consultants. The Contractor shall also provide CD-ROM's with the Operations and Maintenance Manuals in PDF form with a hyper link table of contents, also any and all CAD drawings including as-built shop drawings, equipment descriptions, any required certificates or warranties, and parts lists or other electronically produced submittal items. The Contractor shall also provide a USB flash drive for each space with all project documents including the initial configuration files for the control electronics modules for the stage lighting dimmers and house light dimmers, the stage lighting consoles, the stage lighting network switches, the portable network nodes and all multi parameter stage lighting fixtures. Submit in quantities and file formats as required by the Architect

1. System one-line drawing including all labeling and changes ("as-builts ").
2. All network certifications and/or test reports.
3. Owner's manual for each piece of equipment.
4. Schematic diagram for each piece of equipment.

5. Contractors service phone number in a conspicuous place.

3.10 WARRANTIES

A. Contractor will warrant the system to be free from defects in materials and workmanship for a period of one year from the date of acceptance, or first beneficial use, whichever comes first. Acts of god and owner abuse or neglect are not covered.

B. During the warranty period the Contractor will respond to and correct any call for service within one day of the call.

C. Loaner equipment will be provided if necessary.

D. The manufacturer of the stage lighting and control equipment shall warranty the electrical distribution, dimming and control equipment to be free from defects of material or workmanship for a period of two years from the date of acceptance.

E. The manufacturer shall warranty all fixtures and accessories (except lamps) to be free from defects of material or workmanship for a period of one year from the date of acceptance. During the period of this warranty, equipment that proves to be defective shall be repaired or replaced at no charge (excluding freight). Unauthorized local repairs of equipment during the warranty period shall relieve the manufacturer of his responsibilities under this warranty.

F. Include the name, address, and phone number of at least two- (2) factory authorized Field Warranty centers within a 250-mile radius of the job site in the operation and maintenance manual.

3.11 FINAL ACCEPTANCE

A. The following conditions must be met before final acceptance will be granted:

B. Inventory of all equipment by the project Architects or his representative.

C. All inventoried portable equipment is in secure storage, accessible only by the Owner.

D. Approval of final tests and inspections by the project Architects, Theatre Consultant, and Owner.

E. Submittal to the Architect of three (3) signed copies of all warranties.

F. Satisfactory completion of all punch list items.

G. At the date of system activation, the Contractor shall furnish and replace all lamps in stage lighting fixtures, which are observed to be noticeably dimmed, as judged by the Architect or his representative.

END OF THIS SECTION

SECTION 11 6156

AUDITORIUM AUDIO AND VIDEO SYSTEMS

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Special Conditions and Division-1 Specification sections, apply to work specified in this section.

1.02 RELATED WORK AND REQUIREMENTS

A. Basic Electrical Requirements

B. Raceways and Conduits

C. Wires and Cables

D. Outlet Boxes

E. Grounding

1.03 SCOPE OF WORK

A. This section requires the fabrication, furnishing, delivery, installation, testing of the sound and video systems and equalization of the sound system as indicated on the drawings and specified herein.

B. The AV system sub-contractor shall provide all materials, equipment, procedures, labor, tools, scaffolds, and incidentals necessary to the scope of work.

C. It is the intention of these specifications that the AV system sub-contractor provides a professional quality, complete and properly operating system in every respect and detail.

D. The AV system sub-contractor shall examine the plans in detail to familiarize him with the scope of the work.

E. The AV system sub-contractor shall assume full responsibility for a complete operating installation, in the required location, in accordance with the contract documents.

F. The AV system sub-contractor shall provide all necessary specialty equipment for the complete sound and video system installation as specified herein.

G. The AV system sub-contractor shall provide all necessary specialty equipment for the complete sound and video system as shown on the drawings.

H. Any errors, omissions, or ambiguities found in these documents do not relieve the AV system sub-contractor of the responsibility of providing all items necessary for complete, safe, fully functional systems. Any errors, omissions, or ambiguities shall be brought to the attention of the Architect/Engineer of Record, Owner, and/or Theater Consultant for clarification.

I. The drawings and specification when taken together communicate the design intent of the system. The AV system sub-contractor is responsible for all engineering, procedures, drawings, equipment, material, means and methods, and contract administration necessary to fully and completely provide and install the system contemplated by these documents.

J. No changes will be allowed for any issue that could have or should have been known at the time of bid. This includes but is not limited to discontinued products.

K. The AV system sub-contractor is solely responsible for meeting all codes and regulations and for the complete code compliance of the finished system.

L. The AV system sub-contractor shall employ the most current best standard practices for all aspects of work.

M. The AV system sub-contractor acknowledges that the consultants' opinion is final.

N. It is the AV system sub-contractor responsibility to ensure that the system and all of the system components, fixtures, equipment, devices, wire, terminations, field assemblies (including custom assemblies), etc pass all required inspections by the local authority having jurisdiction.

O. DSP programming, system tuning and complete configuration of all components.

P. Crestron programming.

Q. Register all wireless mic frequencies in the "White Space" data base.

R. Coordinate fully with the electrical contractor.

1.04 DEFINITIONS: FOR THIS PROJECT, THE FOLLOWING ENTITIES ARE REFERENCED:

A. Brandywine School District, Wilmington, DE

B. Architect: ABHA Architects, Wilmington, DE

C. Theatre Consultant: Scheu Consulting Services, Inc., Fayetteville, Ny

1.05 WORK INCLUDED

A. The drawing and specification package is conceptual in nature. The contractor is responsible for all details and requirements specified here. This will require engineering and detail design effort on the part of the AV contractor

B. Auditorium Sound and Video System

1. Sound reinforcement system. A sound reinforcement system with stereo speaker arrays, digital mixing console, connection plates, system electronics, hardware and accessories.
2. Video presentation system.
3. Show monitor system.
4. Production intercom system.
5. Assisted listening system.
6. All speaker rigging.
7. Control system programming in a manner that meets all the owner's needs and request in terms of function and usability.
   a. Creston control pages must be controllable via iPad
   b. Crestron control: in addition to the touch panel, provide both executable and web-based x-panel interfaces
8. Supply all non-standard back boxes shown on the electrical drawings.
9. Control booth wire duct. The contractor is to install "Panduit" type plastic wire ducts in the sound booth. These ducts are to carry all necessary cabling between the under

counter junction boxes, the processing rack mounted on the wall, and the mixing console. A separate duct is required for each signal level

10. Other requirements.
    a. All RJ45 jacks and portable cables shall be color coded according to function.
    b. All RJ45 portable cable shall be heavy duty service type – TMB ProPlex or equal.
    c. All RJ45 jacks shall be Nuetrik EtherCON.
11. Power:
    a. Provide Lyntec sequencing power panel
    b. Provide power distro inside all racks. Provide a jbox in the top of each rack for the electrical contractor to "make up" to. Provide power strips, power outlet boxes, internal rack wiring and everything necessary to power up all rack equipment.

1.06 COORDINATION WITH OTHER WORK:

A. The AV system sub-contractor shall specifically coordinate the placement and sizes of conduit relating to this work and shall specifically review and approve the conduit rough-in in time to advise all parties of needed changes, omissions, etc. This coordination encompasses both low voltage and electrical power. The AV system sub-contractor shall report this successful coordination in writing to the owner's representative. Failing this, the following will be enforced:
    1. The AV system sub-contractor shall provide and install any additional conduits required for the hookup, proper location and proper isolation of the various cable / signal types and equipment in the systems. The AV system sub-contractor must coordinate his conduit installation with those installed by the electrical contractor. All conduits shall be sized to their intended fill plus fifty percent.

B. The following items of work, if required, are included in other sections and must be reviewed by the AV system sub-contractor for impact on this work:
    1. Stage flooring.
    2. Theatrical stage lighting, theatrical stage rigging, curtains and tracks, and general electrical equipment.
    3. Catwalks.

C. The AV system sub-contractor shall at all times coordinate his work with the other trades to ensure smooth progress of work and satisfactory final results.

1.07 AV SYSTEM SUB-CONTRACTOR QUALIFICATIONS

A. Only qualified AV system sub-contractor shall be used.

B. The intentions is that the work of this section will be contracted to a single firm, referred to as the AV system sub-contractor.

C. The AV system sub-contractor shall be a systems integrator who regularly engages in the furnishing, installation and servicing of professional systems of similar nature, size, scope and complexity to that contemplated by this specification. The AV system sub-contractor shall have done so for a period of not less than five years preceding the bid date.

D. The AV system sub-contractor shall have maintained for the five years preceding the bid date, a suitably staffed and equipped service organization which has continuously offered maintenance and repair services for systems of the nature, size, scope and complexity to that contemplated by this specification.

E. All liens must be satisfied for at least five years.

F. The AV system sub-contractor shall be licensed and insured.

G. The AV system sub-contractor shall be a factory authorized dealer for all major system components:

1. Mixing console
2. Speakers
3. Digital signal processors
4. Amps
5. Control system
6. Wireless microphones

H. The contractor shall demonstrate to the satisfaction of the owner, through exhibits presented with his bid, that the sound contractor has a history to indicate the following:

1. Statement of current company capabilities and ownership.
2. Statement of company history. Include a breakdown by percentage of gross sales of all business activities the contractor is involved in for each of the last 5 years (e.g. system installation = 30%, box sales = 40%, equipment rentals = 20%, design and other professional services = 10%, etc).
3. Previous experience: Provide a list of four installations of the type and size contemplated by these specifications, currently in use as originally installed, in which a theatre / system consultant was involved, completed in the last 5 years and the following information regarding each installations:
   a. Name and address of each installation facility.
   b. Facility owner and telephone number.
   c. Name, address, and phone number of a person regularly employed by the owner, who is familiar with the operation of the systems and who has no connection or business connections with the contractor except as the contractor shall fully disclose
   d. Name, address, and phone number of the theatre / system consultant, along with the names of all the consultant's personal directly involved.
   e. System shop drawing - These will be returned if the contractor provides a call tag or return postage.
   f. Owner's manual drawing - These will be returned if the contractor provides a call tag or return postage.
   g. System as-built drawings drawing - These will be returned if the contractor provides a call tag or return postage.

h. List of contractors personal involved with each persons responsibility on the project.

i. Name, address and phone number of the general contractor, along with the names of all key GC personal directly involved.

j. Name address and phone number of the electrical contractor, along with the names of all key EC personal directly involved.

4. Key Personnel: For each of the key personnel listed below; Include individual's name, title, and number of continuous years of service to contractor. Include a biography detailing industry experience, and role within organization (include only full-time/regular staff employees; not independent contractor, freelance, or temporary positions). List all industry certifications held, training courses attended, and continuing education credits, including dates of attendance. List recently completed projects, scope of project, and completion dates.
   a. Project Manager
   b. Senior Technician
   c. Service Manager
   d. Other Department Staff – Include size of staff, and experience of each staff member.
5. Replacement and Spare Parts Inventory – Provide detailed list of primary replacement parts, components, and spares typically held in inventory.
6. Test Equipment and Physical Plant – Include an inventory of all test facility equipment owned and used regularly by the Service Department. Provide description of physical plant and space utilization.
7. Statement of adequate plant, equipment, test facilities and inventory to pursue the work properly and perform in a timely fashion.
8. Copies of all business and professional licenses and insurance certificates

2.00 PRODUCTS

2.01 ALTERNATES

A. In no case will equipment or materials of lesser design or workmanship be acceptable. Only those materials and equipment listed in this specification will be considered unless prior approval is sought and received.

B. Substitutions: When a specific piece of equipment specified has been discontinued and/or replaced by a new model, substitution will be acceptable when:
   1. Submission of complete data on the new model or substitute has been approved by the owner prior to equipment acquisition. Data shall include list pricing for specified and replacement equipment.
   2. Substitute equipment or the replacement of rejected equipment shall be at the sole expense of the AV system sub-contractor.
   3. After submittals have been approved there will be no cost to the owner for any required replacement equipment under any circumstances.

C. Should the AV system sub-contractor proposed and receive approval for the use of alternative wire and cable which requires additional conduit, the AV system sub-contractor will be solely responsible for the installation of such conduit.

2.02 GENERAL REQUIREMENTS

A. The major items of equipment shall be furnished in the quantity as on the drawings and the quantity as specified herein.

B. When documents list several acceptable manufacturers for a particular item of equipment, more than one of which is to be provided, the AV system sub-contractor shall supply all of those similar items of equipment from one manufacturer.

C. The AV system sub-contractor will provide necessary millwork, enclosures, baffles, grille cloth, wall plates, and any other item furnished under this contract not specifically noted otherwise herein or on the drawings in a manner and color as approved by the owner.

1. Any item of equipment or hardware that may not be specifically shown on the drawings or specified herein but required for proper sound system operation or installation shall be furnished and installed and be of the highest quality available.

D. UL Labels: All equipment, where applicable standards have been established, shall be listed by Underwriters' Laboratories, Inc., and shall bear UL label when delivered to the job.

E. If so required by the local authority having jurisdiction, anything not arriving at the job bearing a UL label shall be field inspected and label by a nationally recognized testing laboratory recognized and approved by the local authority having jurisdiction. This extends to field assemblies.

F. The performance of all equipment must meet the most recently published manufacture's data sheet

G. Provide all power supplies / portable power cables required.

H. Provide all software.

1. Shure Wireless Work Bench
2. DSP setup / editor software
3. Yamaha StageMix App
4. Yamaha console editor
5. Dante controller software
6. Amp control software
7. Crestron source code
8. Crestron assembled installed code
9. All others as required
10. Creston control pages must be controllable via iPad
11. Crestron control: in addition to the touch panel, provide both executable and web-based x-panel interfaces
12. All others as required

I. Provide all equipment shown on the contract drawings.

J. Provide all equipment in the quantities below and as shown on the contract drawings:

1. ALS-1: Assisted Listening System

   Listen Technologies Corporation (or equal by Williams Sound)

   1 model LT-800 transmitter.

   30 model LR-300 receiver

   30 model LA-161 earbuds.

   1 model LA-326 rack mounting kit.

   1 model LA-116 remote coax antenna.

   1 model LA-313 carrying/storage case

   1 model LA-304 wall plaque kit

   Include a complete set of spare batteries and chargers for all batteries along with required power

   balanced line input module with muting.

2. BSCP: Backstage Control Panel 21U Wall Mount Rack

   Middle Atlantic Products DWR-21-22 include locking, solid front door FD21 and rear rail kit DWR-RR21.

3. CASE-1: Locking Console Case "Anvil" Style flight case for security. Light weight top and front. Shallow tray bolted to counter.

4. ICM-1: Intercom power supply

   Clear Com PS 704

5. LGT-1: Rack mount light / power outlet panel

   Littilite RL-10-D-LED

6. LGT-2: Local Control Light

   Dailight 557 Series red LED panel mount indicator light with voltage determined by DSP logic output.

7. POT-1: Volume Control

   Clarostat panel mount conductive plastic potentiometer with value and taper determined by DSP control inputs + Atlas Sound volume control knob

8. RS2: Standard MAP 12U under counter rack

   Middle Atlantic Products MFR-1227GE

   Remove the casters prior to installation

9. SPK-1: Front Fill Speaker. Include mounting brackets and custom mounting hardware as required.

   Electro-Voice EVU-1062/95

10. SWT-2: Local Control Switch

    SPST MON panel mount push button switch

11. WIR-1: UHF Wireless system. Twelve (12) channels are required. The receivers shall be Shure ULX-D series. Provide standard accessories (i.e. microphone clips, lavaliere accessories, zippered cases, battery, battery charger, ½ wave antennas, power supplies,

receiver rack mount kits, etc). Coordinate frequency band with local TV Broadcast stations and other RF transmission systems in use.

3 @ Shure ULXD4Q quad channel receiver.

12 @ ULXD2/Beta58– handheld transmitter with Beta 58 mic, mic clip and zipper bag

12 @ ULXD1 – bodypack transmitter with zipper bag

12 @ Countryman H6, omni, medium gain, tan, with connector for bodyback transmitter

12. WIR-2: Antenna DA.

    Shure UA845-SWB

13. XFM-1: Balancing Transformer

    Radio Design Labs FP-UBC2

14. All specialty back boxes listed on the electrical drawings.

    CMBP = Surface mount for on stage

    Hoffman 12x12x6 surface mount box

    Whirlwind WFS 12x12x2.5B wall frame

    Whirlwind custom panel as shown

    CMBP = Flush mount for apron face

    12x12x6 flush mount box

    Whirlwind WFF 12x12x2.5B wall frame

    Whirlwind custom panel as shown

    SCL / SCR = Whirlwind black powder coated surface mount 8x8x4 backbox with Whirlwind WFS wall frame or Wireworks Guardian Panel Mounts + custom panel

K. Panels: All panels are made of 1/8" thick Aluminum plate, brushed anodized black and sealed. All controls and connectors will have engraved labels. The minimum allowable label size is 1/8"s. All labels will be back filled with white paint. All connectors are mounted with machine hardware. All panel layouts and labels must be submitted and approved prior to construction, the panels shown in the drawings are typical only. All “D-shape” connectors shall be Neutrik where available. All 6 pin connectors shall be Switchcraft compatable.

L. Microphone Receptacles: The above general requirements for panels apply to the construction of Microphone Receptacles as well. See the contract drawings for quantity and type required.

M. Monitor Speaker Receptacles: The above general requirements for panels apply to the construction of Monitor Speaker Receptacles as well. See the contract drawings for quantity and type required.

N. Intercom Connection Receptacles: The above general requirements for panels apply to the construction of Intercom Connection Receptacles as well. See contract drawings for quantities and types required.

O. Custom panels: See drawings for required components.

P. Connectors: General use unless otherwise called out.

1. All XLR cable connectors are Neutrik “XX” series, black bodies, and silver contacts unless otherwise indicated.
2. All XLR chassis connectors are Neutrik “DLX” series, black bodies and silver contacts unless otherwise indicated.
3. 6 pin XLR connectors for intercom must be “Switchcraft compatible”
4. All RJ45 plugs and jacks are Neutrik EtherCON CAT6A
5. All plugs and jacks shall be color coded sealing covers / rings by function.
6. All speaker cable connectors are Neutrik SpeakON series “FC”.
7. All speaker chassis connectors are Neutrik SpeakON NL4MP-ST.
8. All RCA chassis connectors are Neutrik D-shaped housing, black chrome bodies, solder tabs with white / red isolation washers for stereo left right.
9. All BNC chassis conenctors are Neutrik NBB75DFIB-P (isolated, feed through, D-shape, black housing, protruding version). Provide color coded (by function) rubber sealing cover.

Q. System Wire: All wiring installed in a conduit which is located in the slab must be rated for wet locations.

1. 10 A.W.G. for speaker lines enclosed in conduit, racks, or speaker enclosures. Use for all speaker runs except 70 volt systems. 10 A.W.G. THWN.
2. 16 A.W.G. twisted pair for RMS control system and for 70 volt audio wire for use in conduit, racks, or speaker enclosures. West Penn Wire AQC 225
3. 22 A.W.G. shield twisted pair for all mic, line or D.C. control lines enclosed in conduit or racks. Belden 5500F1 or West Penn Wire AQC 291
4. 18 A.W.G. Shielded twisted pair with 18 A.W.G. drain wire for all intercom lines enclosed in conduit or racks. Belden 5300F1 or West Penn Wire AQC 293. An additional 12 A.W.G. THWN will be required if speaker stations are used. This additional wire shall be used in parallel with the drain wire of the shielded twisted pair cable.
5. 24 A.W.G. shield twisted pair for all AES/EBU digital audio lines enclosed in conduit or racks. West Penn DA2401.
6. Coax Antenna Lines. As called for by equipment manufacture.
7. UTP Category 5E network cable. Four twisted pair of 24 A.W.G. wire with an outer diameter suitable for termination by standard type RJ-45 connectors. Use for all Category 5 cable run within a conduit or raceway. Belden 7934A.
8. STP: Category 5E network cable. Shielded four twisted pair of 24 A.W.G. wire with an outer diameter suitable for termination by standard type RJ-45 connectors. Use for all Category 5 cable run within a conduit or raceway when STP cable is required. Belden 7937A.
9. Category service cable. Use for all Category cable NOT run within a conduit or raceway. TMB Associates ProPlex Ethernet cable.
10. RG6 coax for all video cable (including HD-SDI) West Penn Wire AQC806
11. RG 11 coax for wireless receiver antennas Liberty RG11-DB-CCTV

12. RG59 coax as required West Penn Wire AQC 815
13. Crestron cable as called for by manufacture. Wet location rated as necessary by installation location.
14. HDMI cable: Extron HDMI Ultra Series

R. Power:

1. Lyntec sequencing power panel

   Model RCP 341 41/MBR-20 + SGX20-10

   Provide 20A, 30A, motorized, single pole, two pole, and standard breakers as required

   Provide power distro inside all racks

   Provide power cable for portable sound rack (RS3).

2. Internal rack power wiring
   a. Provide all power wiring, devices, hardware, receptacles, etc. as required to power all equipment within each rack.
   b. Provide a junction box located at the top of the rack for connection to circuiting by the electrical contractor.
3. Provide portable power cables for console, any portable racks, and all portable equipment.

S. Portable Equipment: Provide the following equipment that is not shown on the contract drawings:

1. Mixing console accessories:

   2 @ LED console gooseneck lamps

   Dust cover

   MY8-AE96S Card for slot 1

   Custom Whirlwinf DBF3-FM-10 AES/EBU DB25 to XLR fanout for MY8-AE96S card

2. Microphones. Provide a mic clip for each mic.

   6 @ Shure SM-58

   4 @ Shure SM-57

   2 @ Audio Technica 4040.

   4 @ Audio Technica 4041.

   5 @ Crown PCC160.

   1 @ Countryman Type 85 Direct Box.

   1 @ Emtech Electronics, Inc. Model EJ-10 multi-input adapter box.

   1 @ Whirlwind PCDI

   6 @ Audio Technica 853A hanging mics

3. Microphone Stands & Accessories.

   12 @ Atlas Soundolier MS12CE

12 @ K&M KM210/91 black, mic stand w/boom

4. Intercom belt pack.
   6 @ Clear Com RS-701.
5. Intercom single muff headset.
   6 @ Clear Com CC-95
6. Mic Cables: Whirlwind MKQ series in black.
   10 @ 10 feet
   20 @ 30 feet.
   6 @ 50 feet.
   6 @ 100 feet.
7. Speaker Cables.
   4 @ Whirlwind NL-4-50
8. Patch Cables and Adapters - Audio
   2 @ Neutrik NL4MM.
   2 @ Switchcraft 389.
   2 @ Switchcraft 390
   2 @ Switchcraft 387A
   2 @ Switchcraft 386A
   2 @ Switchcraft 384A
   2 @ Switchcraft 383A
9. Video adapters & cables:
   1 @ Liberty AV Solutions DL-AR360
   1 @ Liberty AV Solutions DL-AR392
   1 @ Liberty AV Solutions DL-AR
10. Headphones.
    1 @ Sony MDR-7506
11. Monitor Speakers.
    2 @ Electro-Voice ZLX-12
    2 @ Ultimate Support TS-90B speaker stands
    2 @ Elevtro-Voice ZX1

3.00 EXECUTION

3.01 SUBMITTALS:

A. Submittals: The AV system sub-contractor, within thirty days of the bid award and prior to beginning work, shall submit all of the following at the same time to the owner for approval:

B. Drawings: Complete shop drawings details and complete on all phases of installation including a minimum of:

1. Device location plan drawing(s)

a. Location of all devices

b. Confirm box type – surface or flush – as acceptable and constructible based on box depth and wall construction

c. Confirm color of all surface mount boxes

2. System wiring diagram
   a. Show Dante ID and other setup info
   b. Show wireless frequency coordination
   c. Show IP address management
   d. Show RF levels on TV distribution system
   e. Show EDID information and management
   f. Make and model of all equipment
   g. All connection points on each piece of equipment
   h. All wire types
   i. All connector types
   j. All cable labels
3. Rack elevations
4. Details of all connection plates and custom panels
5. Rack and equipment labels
6. Mounting and rigging details for all equipment
7. Drawing showing the projector, the screen, the throw distance and all lens calculations in plan, elevation and section.
8. All options and / or variations must be clearly marked with ¼’ text and highlighted in yellow.

C. Mountings and Attachments: Prior to equipment installation, the AV system sub-contractor will submit to the owner detailed scale drawings of all proposed enclosures and speaker mounting or rigging weighing more than ten pounds. All mountings and attachments must be approved and stamped by an engineer licensed in the same State as the installation prior to the beginning of the installation.

D. Materials and Equipment: The AV system sub-contractor will submit to the owner a complete list of all materials and equipment to be furnished including catalog cuts for all equipment items. These must contain full information on dimensions, construction, applications, etc. to permit proper evaluation. In addition, they must be properly identified as to their intended use and any options or variations must be clearly marked. The contractor is to confirm equipment availability at time of submittal. It is assumed that all equipment submitted on is and will be available.

E. Test Equipment: The AV system sub-contractor will submit to the owner a list of test equipment to be used to test, equalize and demonstrate the final installation.

F. Schedule: Prior to the commencement of the installation work, the AV system sub-contractor shall submit for approval, to the owner, an outline of a proposed commencement and completion schedule and project requirements.

G. Variations: Any deviation from what is specified here and or shown on the system drawings must be "starred" and noted in ¼" high letters on the shop drawings and highlighted in the submittal data.

H. Approval of shop drawings and materials does not relieve the AV system sub-contractor of any responsibilities.

3.02 COORDINATION WITH OTHER WORK:

A. The AV contractor shall specifically coordinate the placement and sizes of conduit relating to this work and shall specifically review and approve the conduit rough-in in time to advise all parties of needed changes, omissions, etc. The AV contractor shall report this successful coordination in writing to the owner's representative. Failing this, the following will be enforced:

1. The sound contractor shall provide and install any additional conduits required for the hookup, proper location and proper isolation of the various cable / signal types and equipment in the systems. The sound contractor must coordinate his conduit installation with those installed by the electrical contractor. All conduits shall be sized to their intended fill plus fifty percent.

B. The contractor shall at all times coordinate his work with the other trades to ensure smooth progress of work and satisfactory final results.

3.03 INSTALLATION:

A. Comply will all recognized industry standards, professional practices and references.

B. Personnel: A single, competent, technically qualified foreman will oversee the entire job from start to finish. This foreman must:

1. Be present on the job site during all phases of installation and testing.
2. Be authorized to receive instructions from the Architects or their representatives.

C. Only experienced sound installers shall be employed on this job.

D. The AV system sub-contractor shall keep the job adequately staffed at all times.

E. All job documents pertaining to the installation of this system will be accessible to all workers throughout the installation process.

F. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes.

G. The AV system sub-contractor shall not commence the installation of equipment and devices, other than the pulling of cable, until all areas are clean, painted and finished to a point that they are completely dust, dirt, lint, fiber and airborne particle free. The air conditioning system must be operating to its design level and be able to keep all areas with sound equipment stable.

H. General Workmanship:

1. The installation of all work shall be neat.
2. All boxes, equipment, etc shall be plumb and square.

3. The installation shall conform to the plans and spec.
4. Equipment racks shall be assembled, wired and tested in the AV system sub-contractor shop prior to delivery to the job site.

I. Wiring:

1. If enclosed in conduit run only similar signal levels in a single conduit.
2. All pulls to be made be hand, care will be taken not to nick cable jackets, and any nicked or damaged cable will be replaced.
3. A pull string will be left in all conduits after wire is installed.
4. NO SPLICES WHATSOEVER IN CONDUIT!
5. If not enclosed in conduit neatly group cables into bundles and secure out of harms way.
6. Separate cable grouping by signal level. Mic and A.C. power shall be not less that 18" all other levels by not less than 6".
7. Include spare cables with all field runs. Quantity to be 10% or 1 which ever is greater unless otherwise specified.

J. Terminations:

1. All cables shall be permanently labeled at every termination.
2. Service loops of not less than 6" will be present at all terminations to equipment.
3. Where terminal blocks or barrier strips are used only uninsulated fork terminals with a brazed seam, sized according to wire and stud sizes, crimped with notch across from the seam will be approved.
4. Use barrier strips on equipment where provided.
5. Where shielded cable is in use leave shield drain wire the same length as the circuit conductor(s), sleeve shield drain wire in green pvc tubing. Cap where the cable jacket was removed with heat shrink. Where the shield drain wire is to be lifted follow the above and fold back over cable jacket. Then cap end with heatshrink. Do not use a single piece of heatshrink for this use two smaller ones.
6. All soldering will be clean and neat and not exhibit evidence of a " cold" joint, were necessary heat sinks will be used. Use only rosin core "electronic type " solder.
7. Wire nuts will be allowed only for field connections of 70 volt speaker lines and priority attenuation control lines, and then only when the proper size is used.

K. Polarity:

1. The " high " side will be connected to pin 2 on XLR connectors, to tip on 1/4" connectors and to the pin on phono connectors.
2. The " low " side will be connected to pin 3 on XLR connectors, to ring on 1/4" balanced connectors and to case on phono connectors.
3. Microphones will be wired so that an acoustic compression at the diaphragm produces a positive going signal on pin 2 with respect to pin 3.
4. Speakers will be wired so that when a positive going signal is applied to the + or red terminal an acoustic compression is produced.

5. The system will be wired to maintain absolute polarity though all system components to insure that a positive signal on pin 2 or tip produces a positive signal at the + or red speaker terminal.

L. Shield Grounding:

1. Do not tie pin 1 to case of XLR connectors anywhere.
2. Microphone shield drain wires will be grounded only at mixer inputs. Where microphone lines and mixer inputs run though a patchbay, connect shield drain wire to sleeve of patchbay connector and only to this point.
3. Line level lines will have shield drain wire lifted from ground at outputs and connected to ground at inputs.
4. The intent here is to not make ground loops, should any situation arise which would form a ground loop, please inform the owner for direction.

M. Mountings and Attachments:

1. Any and all structural, mounting, or rigging details are shown on the drawings for concept only.
2. The detail drawings and calculations of all proposed mounting or rigging of any equipment weighing more than ten pounds will be approved and stamped by a P.E. who is licensed in the same State as the installation.
3. Each cluster element is to be individually adjustable.
4. Provide for an adjustment range of +/- 10 degrees from the information shown in the contract documents.
5. In the absence of specific direction otherwise, standard rigging practices shall be followed.

N. Labels:

1. Cable Labels: All cables shall be labeled at all termination points. The label shall not be hand written. Clear heat shrink shall cover the label.
2. Equipment Labels. All equipment shall be labeled front and rear. Labels shall functionally describe the use of each piece of equipment. On equipment having multiple channels, each channel shall be labeled. Additionally the equipment label will call out equipment designation which will correspond with the designations shown on the approved AV system sub-contractor one-line diagram. Labels shall be engraved lanacoid, white letters on black background, with a minimum letter size of 3/16". Approved patchbay labeling may vary from this.

O. Power Sequencing. The system shall turn on and off, in proper order, on circuit at a time, when the power switch is pressed. The power light shall be solid on when all circuits are on, and shall flash during sequencing.

P. The system may not be used prior to checkout.

3.04 INSPECTION AND TESTING:

A. During the installation of the equipment the AV system sub-contractor shall arrange for access as necessary for inspection of equipment by the owner's and/or architect's representatives.

B. Provide a safe means of accessing all system components for all visits.

C. Equipment Pretesting: All racks are to be built and wired in AV system sub-contractor shop and tested prior to delivery to site. All other equipment is to be tested prior to delivery and installation. A written test report will be submitted to the owner.

D. Test and certify all CATx cable runs and present testing report.

E. Final Inspection:

1. The final inspection will confirm that the systems, as installed, meets the requirements of this spec, the contract documents, and the approved AV system sub-contractor shop drawing and submittals.

2. The AV system sub-contractor will inform the owner in writing of the system's completion. The AV system sub-contractor will then request final inspection by the consultant, and carry out the necessary coordination. This coordination includes:
   a. Giving at least fourteen days notice to the consultant prior to the final inspection.
   b. Arranging for the AV system sub-contractor and consultant's exclusive use of the space.
   c. Arranging for a HVAC technician to be available to turn the AC system on and off as required.
   d. Arranging for a lighting technician to be available to control the stage lighting as required.
   e. The AV system sub-contractor job foreman and one additional worker familiar with the job will be present during all check out, testing and tuning.

3. AV system sub-contractor will complete the following tasks prior to consultant's arrival:
   a. Unpack and assemble all portable equipment.
   b. Place all portable equipment in one location.
   c. If anything has been turned over to the owner have the signed Letters of Transmittal on site.
   d. Complete all required paperwork (pre-testing reports, letters indicating successful coordination of the installation, etc.).
   e. Remove all security covers.

4. AV system sub-contractor will provide all necessary software, cables, and interfaces to facilitate the setting of computer, remote controlled, or DSP based equipment.

5. AV system sub-contractor will either: 1) relocate all system equalizers to a tech area in the house for the duration of system tuning or 2) for remotely controllable devices, locate the control position in a tech area in the house for the duration of system testing. In ether case a tech area in the house will be required with a minimum of a 4' x 6' folding table, intercom communications to the rack and console locations, and AC power.

6. AV system sub-contractor will provide the following test equipment for use during tuning and acceptance testing:
   a. Sennheiser ZP-3 impedance bridge.

b. Low distortion sine wave oscillator with variable sweep (start frequency, stop frequency, and sweep rate).

c. Distortion meter.

d. Oscilloscope dual channel, 100Mhz, .001v/div vertical amp.

e. Noise generator that will provide pink, white, or bandwidth limited pink noise.

f. Portable 1/3 octave real time audio spectrum analyzer.

g. Precision sound level meter with filter set.

h. Polarity checker.

i. Precision true R.M.S. reading A.C. millivolt meter with dB scale.

j. Meyer Sound SIM 3 complete with all necessary accessories and at least 3 matching measurement microphones.

k. Playback and recording media for testing all supplied source equipment.

7. AV system sub-contractor will provide safe means to access all system components during the entire commissioning process.

8. AV system sub-contractor shall provide personal and equipment to make adjustments to the speaker cluster(s), as well as to correct problems, for the entire inspection and testing period.

F. The Theatre Consultant or his representative will conduct all final system tests and equalization adjustments in order to determine final acceptance.

G. In no event shall the theatrical AV systems installation be submitted for final approval or acceptance until any and all elements of the facility that may have a bearing on the system performance, including but not limited to doors, windows, HVAC, carpeting, furniture, wall coverings, interior design elements, lighting and lighting control systems have been completed and are operable. All elements that may effect sound systems operation or performance shall be "on" and operating during adjustments. The AV system sub-contractor will be responsible for coordinating the requirements of this paragraph with other work on the project.

H. Should more than two trips be required to complete the systems testing, systems tuning, and clearing punch list items, the AV system sub-contractor will be charged for any additional visits. These charges will include:

a. A minimum of two people at a rate of $1250 per day per person.

b. Travel expense to and from the job site.

c. These charges will be paid to the consultant, in advance of the consultant’s arrival on the job site.

3.05 MANUALS:

A. Prepare four identical copies of owner’s manuals. The owner is to receive two, the consultant receives one and the AV system sub-contractor retains one. Before distribution of manuals submit one copy to consultant for approval. Each manual is to contain the following:

1. System one line drawing including all labeling and changes (“ as builts “).

2. Owners manual for each piece of equipment.

3. AV system sub-contractor service phone number in a conspicuous place.
4. All test reports.

B. Provide all information as PDF files on CDs to be included with each manual.

C. Load all manual data as PDF files onto the iPad and system laptop.

D. Load all available help files on the laptop.

3.06 INSTRUCTION: THE FOLLOWING IS TO BE CARRIED OUT WITHIN TWO MONTHS OF SYSTEM ACCEPTANCE:

A. Provide a total of 12 hours of instruction, on a maximum of two occasions. This is to be time on site, travel time is not to be included within the allotted time.

B. Provide operational assistance for the first usage of the system. This is to be on the owners time schedule but, not to exceed 8 hours.

3.07 WARRANTY

A. AV system sub-contractor will warrant the system to be free from defects in materials and workmanship for a period of one year from the date of acceptance, or first beneficial use, which ever comes first.

B. Acts of god and owner abuse, or neglect are not covered.

C. During the warranty period the AV system sub-contractor will respond to and correct any call for service within one day of the call. Loaner equipment will be provided if necessary

END OF THIS SECTION